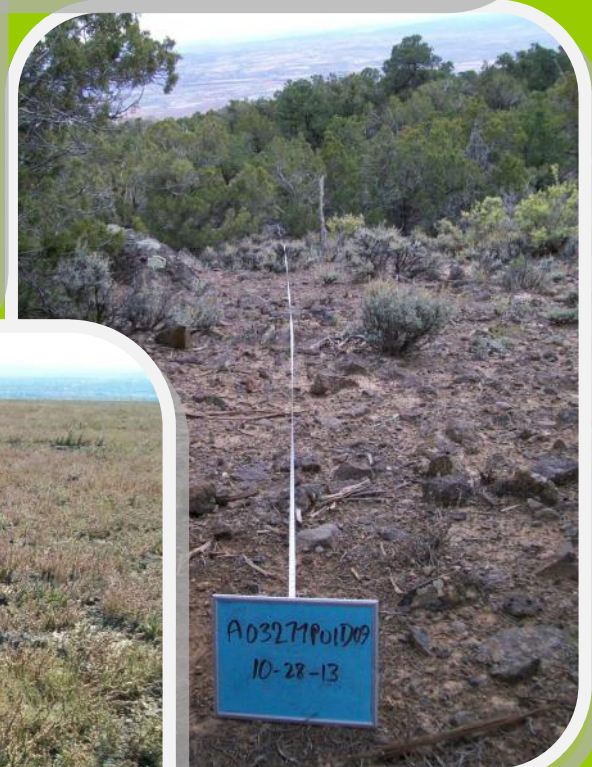
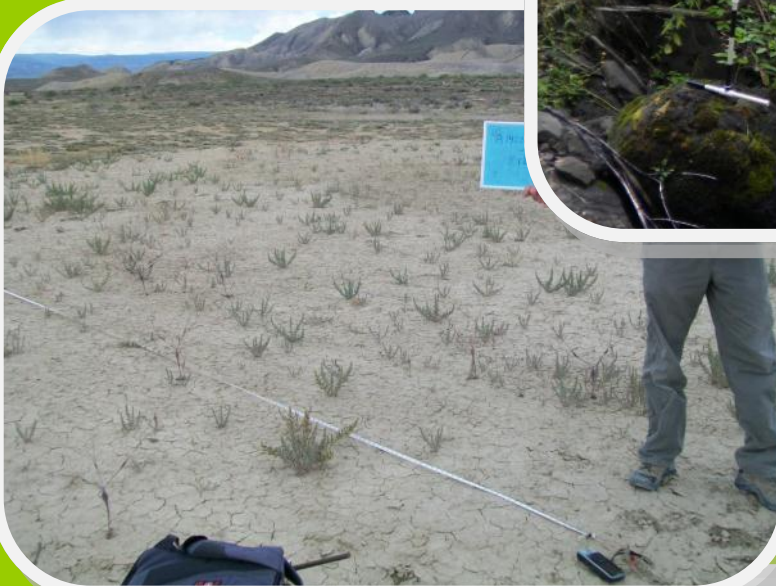


North Delta Land Health Assessment
Bureau of Land Management
Uncompahgre Field Office

2013-2014



Memo

To: Barbara Sharrow
From: Amanda Clements
Date: September 29, 2014

This report describes the findings of the Land Health Assessment for the North Delta Unit. The assessment was based on permanent upland and riparian monitoring transects, bird inventories, water quality and macroinvertebrate sampling. This data was used to reevaluate Land Health determinations and to determine trends in indicators throughout the unit. The report contains acreages meeting and not meeting the standards, types and locations of problems occurring on the land, and recommendations for addressing the problems. This report should be used and referenced in the NEPA analysis of all subsequent actions occurring in the North Delta Landscape Unit.

I concur that this report constitutes the Land Health Assessment for the North Delta unit and fulfills the requirements for an evaluation of the landscape unit relative to the Colorado Land Health Standards.



Barbara Sharrow, Field Office Manager
Date: 1-9-15

Executive Summary

Land Health status and trend within the North Delta unit were reevaluated in 2013 and 2014. This area was first evaluated in 2001-2002. This reassessment is based on long term monitoring data to update the status and trend of the original land health polygons. The goal of this approach is to increase the efficiency of data collection through improving the link between long term monitoring studies and the land health determination process. The desired result is to facilitate management for improved land health.

This document is formatted to provide key information relating to Land Health Determinations, Causal Factors, and Remedies to address land health problems. An updated GIS layer for land health provides resource specialists with an interface to view the land health data and use it as part of the land management process. The GIS layer provides a dynamic tool and the ability to view land health information at a close-up level, which this document is not able to do.

The updated Land Health determinations show that 14% of the nearly 65,000 acres of public land in the North Delta Landscape Unit fully meet all five of the Colorado Standards for Public Land Health, and another 62% meet the Standards with some problems. Some 22% of lands do not meet Health Standards. The five Land Health Standards include Standard 1 for soils, Standard 2 for riparian/wetland areas, Standard 3 for plant and animal communities, Standard 4 for Special Status Species, and Standard 5 for water quality. Standards 1, 3 and 4 apply to uplands and are measured in acres, while Standards 2, 4 and 5 apply to streams and are measured in miles. The category "Meeting with Problems" is considered to meet the standards, but have issues that could trigger those lands to become "Not Meeting".

Compared to the original Land Health Determinations, slightly more land is now determined to meet standards, more land is also classified as not meeting, while less land is in the meeting with problems category. At a landscape level, the concerns noted ten years ago are still found in the unit with conditions declining in many cases. Those lands in good shape have generally continued to stay that way. Determinations for Standards 4 and 5 show the biggest changes over the past ten years, largely due to growing concerns about habitat condition for sensitive plant species, and the collection of water quality data instead of reliance on soil data.

2013-2014 Land Health Determinations for the North Delta LHA unit.

Standard 1, 3 and 4 are reported in acres, Standard 2 and Standard 5 are reported in stream miles.

	Lands and Streams Meeting (acres or miles / % of unit)	Lands and Streams Meeting with Problems (acres or miles / % of unit)	Lands and Streams Not Meeting (acres or miles / % of unit)	Not Evaluated or Not Applicable (acres or miles / % of unit)
All Upland Standards	8,900 / 14%	38,322 / 62%	13,318 / 22%	910 / 2%
All Stream Standards	7.6 / 53%	3.9 / 27%	2.6 / 18%	0.2 / 1%
Determinations by Standard				
Standard 1	33,410 / 54%	23,165 / 37%	3,965 / 6%	910 / 3%
Standard 2	8.0 / 57%	3.5 / 24%	2.6 / 18%	0.2 / 1%
Standard 3	9,951 / 16%	37,270 / 60%	13,318 / 22%	910 / 2%
Standard 4	12,844 / 20%	33,798 / 55%	12,324 / 20%	2,484 / 5%
Standard 5	11.1 / 78%	3.0 / 21%	0 / 0%	0.2 / 1%

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This large federally threatened Colorado hookless cactus is thriving in the Wells Gulch area within the North Delta landscape unit.

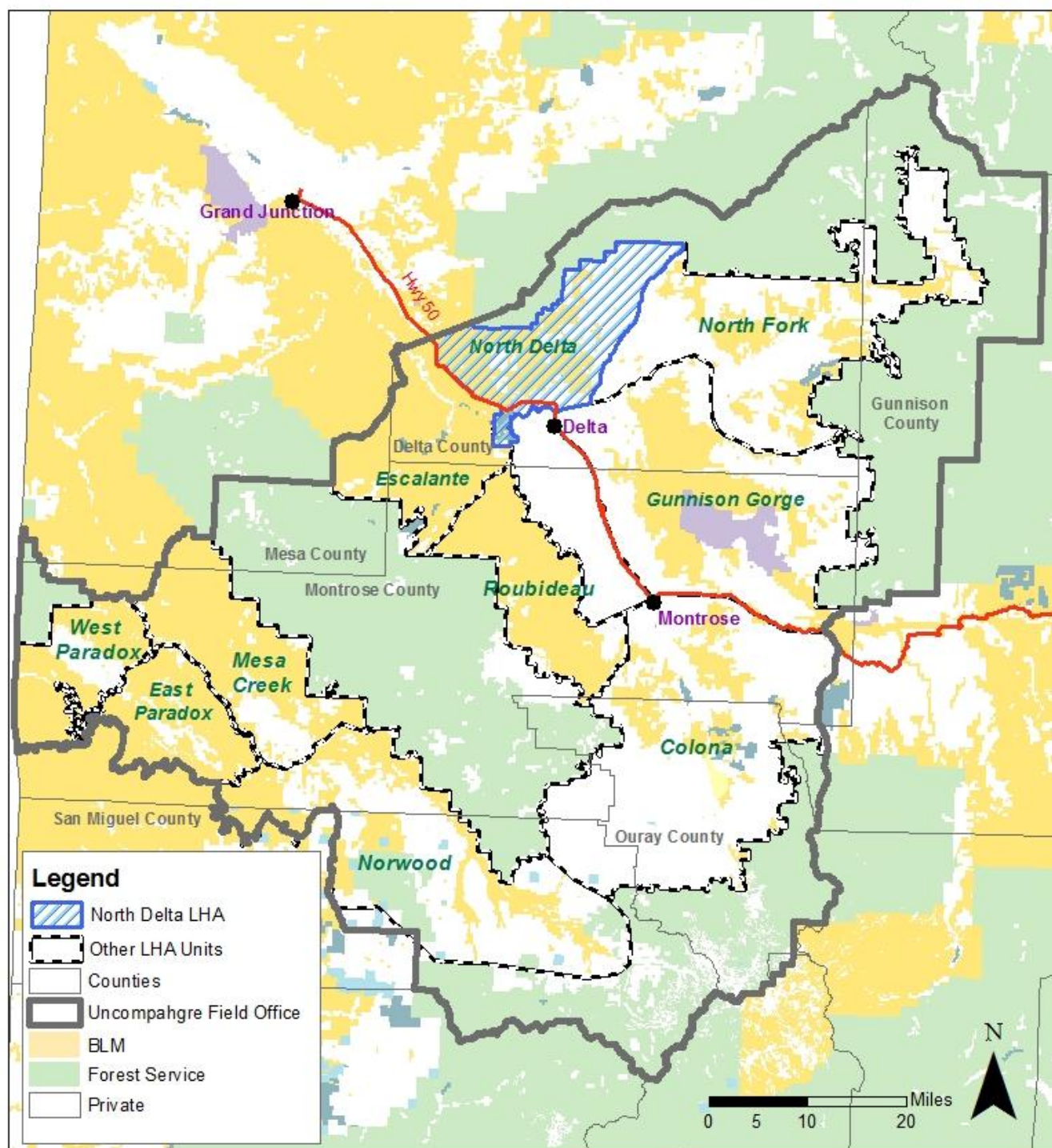


Figure 1. North Delta Landscape Unit location map.

Overview of the North Delta Landscape Unit

Location

The North Delta Landscape Unit is located in western Colorado, in Delta County (Figure 1.) The unit also lies in the northern part of the Uncompahgre Field Office (UFO) of the Bureau of Land Management (BLM), and its boundaries encompass over 117,000 acres. The unit is bounded by State Highway 50 on the south, the Mesa County line on the west and the Grand Mesa National Forest to the north. Since the initial Land Health Assessment, the North Delta unit has been reduced in size. The southern portion of the unit was added to the Escalante landscape unit to better accommodate the Dominguez-Escalante National Conservation Area.

Land Status and Designations

BLM public land totals 61,449 acres, and makes up more than half of the North Delta landscape unit (Figure 2.) Private land makes up nearly all of the remainder. There are three specially designated areas in the unit (see Table 2.) These include more than 18,000 acres that are within the Adobe Badlands Wilderness Study Area (WSA) and the North Delta Open OHV Area. Within the WSA is the Adobe Badlands Outstanding Natural Area/Area of Critical Environmental Concern, which was designated to protect its unique scenic qualities, Threatened and Endangered plant habitat, and for sensitive soils. The unit falls under the Uncompahgre Basin Resource Management Plan (1989). The North Delta unit is divided into 9 grazing allotments which are useful regional subdivisions of the landscape, and are referred to in this document (see Figure 2).

Table 2. BLM land acreages in the North Delta LHA unit by designation type

Designation	Acreage
BLM lands within Adobe Badlands WSA (ONA/ACEC)	10,337 (6,380 in ONA)
BLM lands within North Delta Open OHV Area	8,421
BLM land without special designation	42,682
Total BLM land	61,450

Environmental Setting

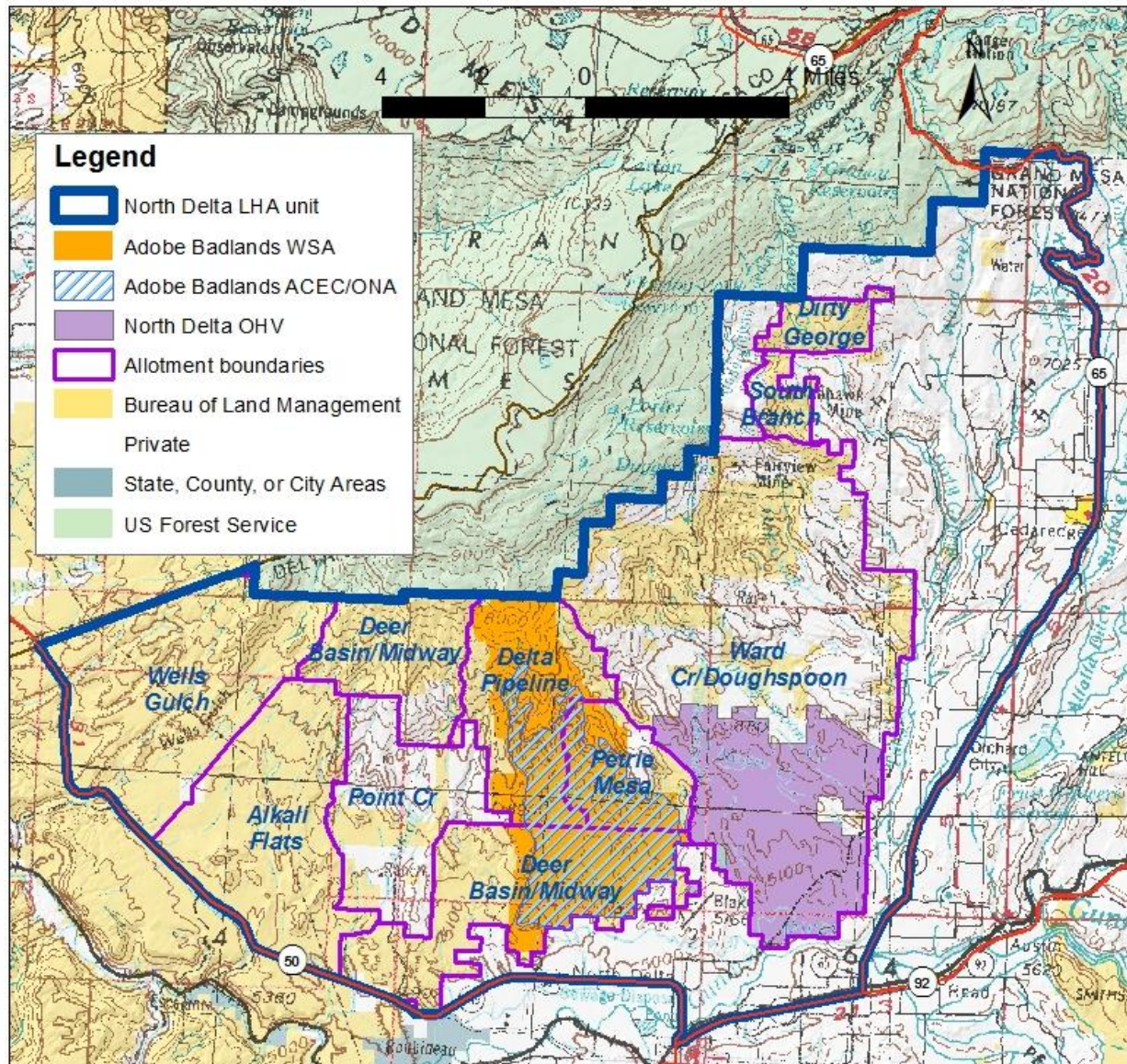
Geology and Landforms

The North Delta landscape unit lies across the dry southern and eastern slopes of Grand Mesa. Elevations range from 5,100 feet to 8,200 feet. Broad and gentle slopes make up a large proportion of the area. Numerous buttes also exist, created out of the basalt debris and the highly erodible Mancos Shales. The unit is located within the Colorado Plateaus Ecoregions (U. S. Environmental Protection Agency, 2005), within a semi-arid climate zone, although precipitation is variable.

Climate and Recent Climate Data

Precipitation is unevenly distributed spatially across the area due to the variability in elevation zones. Based on distribution patterns at climate observation sites in the region, lower elevations (below 6,000 feet) generally receive less moisture than the higher elevations and tend to dry out just after the monsoons end in the fall and remain dry most of the winter. The higher elevations tend to receive consistent moisture throughout the year. Annual precipitation in the nearby town of Cedaredge (elevation of 6,240 feet) has averaged 14.8 inches over the last 30 years, while precipitation in Delta, CO (elevation of 4,930 feet) has averaged 8.5 inches over that time. The yearly cool season (November-April) total in Cedaredge is about 7.5 inches while the warm season (May-October) total is about 7.3 inches. For Delta, the yearly cool season total is about 3.0 inches, while the warm season total is about 5.5 inches. Temperatures in Cedaredge typically range from 0°F lows in January to highs around 90°F in late July. Delta also observes low temperatures in January around 0°F; however, temperatures in the summer are

Figure 2. Land Ownership and Management Designations in the North Delta Landscape Unit.



slightly warmer than Cedaredge with July highs reaching into the upper 90s (°F).

The area was affected by a severe/extreme drought in 2012 when the area only received 83% of normal precipitation, however conditions improved in 2013 and the National Drought Monitor showed drought conditions across Delta County during August through October of 2013 ranged from moderate drought to abnormally dry. Precipitation in 2013 was above average or 106% of normal during the upland field monitoring portion of the LHA. Other notable climate events over the last decade include an exceptional drought in 2002 and 2003, and abnormally dry to extreme conditions 68% of the last 14 years. Precipitation data from Delta indicate that that 2000-2004, 2008-2009 and 2011-2012 were drier than average while 2005, 2006, and 2013 were wetter than average.

The Legacy of Historic Land Uses and a Changing BLM

The history of land use and management in and around the North Delta unit has led to many of the conditions we now see on the ground. Historically inhabited by the Ute Tribe which subsisted on hunting and gathering, the area was next settled in the late 1800s by European descendants. These settlers brought cattle and sheep into the area, and were soon grazing thousands of head in and around the Un-

compahgre and North Fork Valleys, with heaviest use typically occurring nearest to the valley floors. Historic accounts describe extensive impacts from livestock grazing during this period. A regionally important sheep driveway was located in the southern part of the unit, and was used by tens of thousands of sheep to move from summer grazing in the Colorado mountains to winter grounds in Utah. While livestock numbers have been greatly reduced since that time, it is important to note we are still dealing with land health issues that were created during that time period. Cattle and sheep continue to be a primary focus of agriculture in the area with livestock still grazing on public land, however the driving of large herds of livestock through this area has been discontinued.

Settlement of the area included establishment of small farms that used water diverted from streams for irrigation. Development of reservoirs on the top of Grand Mesa, and an extensive network of ditches and water diversions has altered the natural flow of most of the streams in the North Delta unit.

Areas of mancos shale on the south and east side of the unit were contour furrowed and gullies were dammed during the 1960s to reduce sedimentation into downstream reservoirs. These mancos shale “adobe” areas were frequently treated as wasteland by the public. Activities ranged from dumping to target shooting, partying and off-road driving for motorcycles as well as full size vehicles, and these activities continue to take place. The military used a portion of the unit for mortar practice. Population growth brought increased impacts associated with heavy traffic, road maintenance and improvement, and utility Right Of Way (ROW) development along Highway 50 and the county roads which bound the eastern side of the unit. A nationally important utility corridor that includes high voltage powerlines and a buried natural gas pipeline now traverses the landscape unit.

All of these activities have left their mark on wildlife, soils, water quality and vegetation on public lands in the North Delta unit. Many of these activities predated the BLM, and others have taken place early in the BLM’s development as a land management agency. While the BLM has long had a mission of reducing conflicts with livestock grazing, other aspects of the agency’s mission have evolved over the years. Management has broadened to include recreation, wildlife habitat, lands and realty actions, among others. Additionally, BLM’s direction and priorities have changed as the science of land management has advanced and Congress and the Administrative branch of government have added new laws and regulations. Colorado’s Standards for Public Land Health reflect just one of the many refinements in direction that BLM has undergone.

The semiarid climate together with relatively fragile vegetation and soils that are slow to recover from disturbance combine with this history in ways that have impacted land health and the BLM’s ability to bring about changes. Many of the land health problems in the North Delta unit are due to the legacy of heavy use and degradation caused many years ago. Other health problems are associated with exotic weeds which once established are extremely difficult to control. Some problems are associated with uses over which BLM has little or no control, such as the water rights system overseen by the State of Colorado. In other cases BLM has limited ability to change long-held public perceptions and habits, as is the case with off-road driving in the adobes. These factors provide a context for understanding conditions in the North Delta unit, and will in turn shape the actions the BLM chooses to pursue to improve land health.

Adaptive Management Review

Previous Land Health Assessment: Determinations

Table 3. 2002 North Delta LHA Determinations. Figures are shown in blue to avoid confusion with current LHA results.

2002-Combined Acreage Determinations for Standards 1, 3, and 4		
Meeting	Not Meeting	Unknown
62,107 (83%)	9,490 (13%)	2,845 (4%)
2002-Overall Stream Mile Determinations for Standards 2 and 5		
Meeting	Not Meeting	Unknown
63.6 (91%)	5.9 (8%)	0.4 (1%)

2002 LHA: Determinations for Individual Land Health Standards*

Standard	Meeting	Meeting with Problems	Not Meeting	Unknown
Standard 1-Soils (acres)	39,896 (54%)	30,132 (40%)	1,554 (2%)	2,844 (4%)
Standard 2-Riparian (miles)	12.8 (52%)	5.8 (23%)	5.8 (23%)	0.4 (2%)
Standard 3-Healthy Communities (acres)	9,677 (13%)	52,421 (70%)	9,484 (13%)	2,844 (4%)
Standard 4-T&E Species (acres)	74,583 (100%)	0	0	0
Standard 5-Water Quality (miles)	50.2 (72%)	19.7 (28%)	0	0

* The North Delta landscape unit was reduced in size for the 2013-2014 LHA, so total acreages and stream miles in this table are larger than for the current determinations.

The most notable land health problems observed in the 2002 LHA included:

Standard 1: While there were few active, accelerated soil erosion problems observed, many areas throughout the LHA unit had heightened erosion vulnerability. Widespread problems with high bare ground, low plant basal cover and low plant litter relative to averages expected for those Ecological Site Types were observed.

Standard 2: The majority of streams fully met the riparian standard, but problems with noxious weed dominance and some degree of channel incision caused problems along some stream reaches.

Standard 3: Most areas were found to have some problems with standard 3, or not meet it. Widespread problems with perennial grass and cool season grass cover, perennial forb cover, exotic plant presence, noxious weeds (mainly Russian knapweed and tamarisk), and shrub vigor were observed.

Standard 4: No significant problems with special status species were observed in the LHA unit, mainly due to lack of information on threatened Colorado hookless cactus population trends.

Standard 5: No outstanding water quality problems were observed or indicated in the LHA unit. Drainages passing through areas with poor watershed condition—primarily areas having high bare ground and low plant basal cover and low plant litter levels—were inferred to produce more sediment and to convey this sediment into the Gunnison River. Additionally, some drainages passing through the highly saline Mancos Shale Formation were flagged as potentially problematic.

Previous Land Health Assessment: Recommendations and Follow-up Management

Management in the unit has not been specifically driven by the LHA results. However, many actions that have taken place in the LHA unit over the past ten years have been consistent with the recommendations. A summary of the recommendations from the previous LHA is listed below. Blue type indicates where follow-up actions have taken place.

- 1) Using existing road and range/watershed development inventories, identify actively eroding roads and developments, prioritize based on soil erodability, salinity and selenium production, and determine and implement corrective measures. *Some of the contour furrows and check dams have been mapped to inventory gully and erosion problems associated with these old treatments.*
- 2) Where conditions do not meet standards or problems are indicated, adjust grazing to limit dormant season utilization to 50%, limit duration of grazing during the active growing season,

avoid spring and fall grazing in the same areas, limit grazing utilization on native woody riparian species to 30%, rest vegetation treatments for two growing seasons, identify areas off limits to sheep bed ground use, and work toward occasional year-long rest for some pastures. Grazing permits were modified with terms and conditions that specify utilization levels, season of use, duration of grazing during the growing season, and riparian woody species utilization. In some cases, grazing has exceeded the utilization limits set in the permit terms, especially for shrubs. Areas closed to sheep bed grounds have not been identified.

- 3) Using the comprehensive weed inventory for the North Delta area, develop and carry out a strategy to systematically control noxious weeds. The Transco Pipeline should receive highest priority for weed management. Weed management has been guided by an office-wide strategy to treat high priority species using an early detection-rapid response approach. Transco has hired contractors in the past to manage weeds along the pipeline, and reseeded portions of the pipeline several times in efforts to reestablish vegetation.
- 4) Actively restore native vegetation communities in seriously degraded Mancos Shale depositional areas using methods developed in the Gunnison Gorge NCA. Little restoration work has been attempted. We still have little information on successful techniques in Mancos shale areas. The Dominguez wildfire was rehabilitated using an experimental approach with an herbicide that controls annuals, and with strategically seeded species. This treatment did control the annuals for about 3 years, but little response from the seeding was observed.
- 5) Reintroduce fire (or simulate its effects) in portions of the North Delta area where fire has historically been an important natural disturbance. Use the Vegetation Mosaic Objectives outlined in UFO's Fire Management Plan. Seed with native, regionally adapted species where existing vegetation is inadequate or has high levels of weedy species. No fires have been allowed to burn, nor have their been controlled burns in the unit. The Dominguez wildfire burned in 2008, and was sprayed and seeded to prevent domination by annual weeds.
- 6) Work with CPW, USFWS, and in some cases CDOT to better determine status of pronghorn, prairie dog, burrowing owl and kit fox, listed fish species and habitat needs. If necessary, recommend management actions to improve habitat for these species. CPW has transplanted more pronghorn into the area in 2012, and increased their monitoring of the area. BLM is working in coordination with CPW to develop pronghorn habitat improvement projects in the area. CPW conducted a kit fox study in the area of North Delta and Gunnison Gorge NCA in 2012 using camera traps and track plates. No kit fox were detected. Kit fox is considered one of the state's most vulnerable animals. Little work on burrowing owl, or prairie dog has taken place in the unit.
- 7) Consider amending the Uncompahgre Basin Resource Management Plan to include special designations for the CNHP Potential Conservation Areas. The RMP revision is in the draft stage currently, and some alternatives include greater levels of protection for CNHP communities and species of concern.

Land Health Assessment Methodology

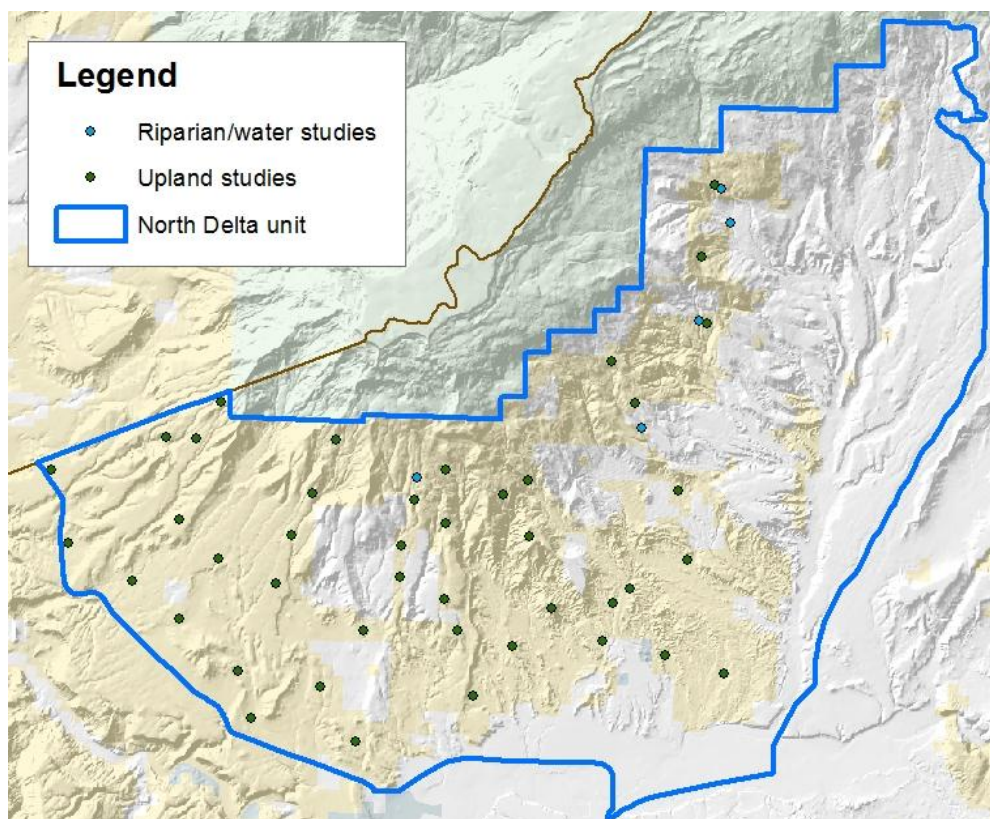
In this review of land health conditions in the North Delta landscape unit, data from long term trend studies is used to evaluate within each of the original land health polygons identified in 2002: 1) current conditions of the indicators against Land Health Standards and 2) trend of those indicators. Additional information collected at each of the study locations and from other sources is also used to determine causal factors. Determinations are updated where current conditions suggest the previous determinations are no longer appropriate. In this Land Health Assessment, determinations continue to be broken out into "Meeting", "Meeting with Problems", and Not Meeting categories as originally implemented and described in the 2002 North Delta Land Health Assessment.

1. Land health polygons were used as a basis for selecting existing permanent long term trend monitoring studies to assess current conditions and trend. Both upland and riparian studies were selected within each of the following categories where applicable: allotments, primary vegetation types, and special management areas. New permanent long term trend monitoring study locations were added where needed. Between existing and new studies, a total of 43 upland and 5 riparian studies were selected (see Figure 3). The majority of the existing studies were established and initially read in fall of 2002, which coincided with a period of extreme drought in Delta County. The 2013 reading coincided with either abnormally dry or moderate drought conditions. Steep areas of rock outcrop, talus or adobe slopes were not represented by studies. They are considered to meet standards.
2. Upland studies were read from late August through early November of 2013 by a range of biological specialists, in accordance with BLM TR 1734-4. Upland field work involved collecting soil surface groundcover data using 90 point-intercepts arrayed along a 100' transect. Plant canopy cover data was collected by plant species using 15 20 x 50cm frames for herbaceous vegetation and 15 2.5 x 6' frames for shrub cover along the same 100' transect. Daubenmire cover classifications were used to estimate canopy cover in order to reduce reader error. Plant species frequency (presence/absence) was also read in the larger plot frames to capture information on less common species. Browse shrub condition was evaluated by using a nearest individual sampling procedure for 25 shrubs along a paced transect. Shrub species, age class, hedge class and vigor were documented for each shrub. Tree stands were also characterized using a nearest neighbor approach to sample 25 trees for age class, species, diameter at stump height, vigor, and average distance between trees. Land health characterization forms were filled out at each study site for environmental, soil erosion, and vegetation characteristics. Each site was also evaluated for evidence of any type of human-related or notable natural influence, and photos were taken at each study site. Wildlife evidence forms were filled out at each study site.
3. Riparian and water-based studies were read in July 2012. Riparian studies followed the Multiple Indicator Methodology modified with a cross section transect as well as the standard transects parallel to the channel. Line intercept data was collected for each plant association encountered along each transect. Lotic Proper Functioning Condition forms were also filled out for each site. Riparian studies included evaluation of the site for evidence of any type of visible human-related or natural influence. Photos were taken at each study site. Wildlife evidence forms were filled out as well. Water chemistry samples and macroinvertebrate samples were collected at some sites and sent to labs for processing. Data from previous years' water chemistry and macroinvertebrate sampling was used.
4. Macroinvertebrate and water quality monitoring was conducted at four locations. A basic surface water suite of water quality parameters including nutrients and metals was run to analyze site conditions. Colorado water quality standards were used to determine if any parameters were above specified levels. Macroinvertebrates were collected at 3 sites and assessed using three measurement metrics. Colorado Department of Public Health and Environment uses a Multimetric Index (MMI) approach to assess aquatic life use attainment. This method uses combinations of metrics that summarize macroinvertebrate response to a range of human impacts and then compares to reference conditions. Attainment thresholds were derived using a statistical methodology that relies on a normal operating range to define use support and interval and equivalence tests (CDPHE, 2010). Additional metrics used for assessing macroinvertebrates included the Hilsenhoff Biotic Index (HBI) and the abundance and richness of the 3 taxa Ephemeroptera, Plecoptera and Trichoptera (EPT).
5. Data was entered into ARCGIS and MS Access databases for riparian, upland, and wildlife observations. Data from the upland transects was analyzed using MS Excel. Where there were enough stud-

ies, paired t-tests were performed to evaluate whether measured trends for land health indicators within allotments, vegetation types, or special management areas were significant (a significance level of $P < 0.2$ was used, BLM TR 1730-1.) Student t-tests were also used to evaluate whether indicators were significantly different from ecological site means (developed for the UFO during the 10 years of original Land Health Assessments) where adequate data was available. A confidence level of 80% was used to make this determination. Detailed data for each transect are available upon request.

6. The ID team met and reviewed the field data, the statistical analysis results, and previous land health determinations for each polygon. A new determination for a polygon was made if there was sufficient evidence that the previous determination was no longer accurate. Determinations from 2002 were carried forward where there was insufficient new data, and past problems were reviewed for each polygon, current status of each problem was documented, and new concerns were added if they were supported by data. The results of the trend analysis were discussed, and the group made trend determinations for each polygon for each standard where there was adequate data, or where it was appropriate to extrapolate data from adjacent polygons. When making trend determinations, special consideration was given to trends of indicators which had been identified as concerns in the 2002 LHA. All rationales for LHA and trend determinations were documented in a supporting spreadsheet.
7. Acreages for Land Health Determinations were calculated in ARCGIS, and maps showing Land Health determinations were generated. Acreage tables were also generated in ARCGIS showing determinations, land health concerns, and trends by percentages of each category.
8. Causal factors were analyzed based on the human-related or natural phenomena observed in the field, livestock utilization and actual use reports. Professional judgment was used to determine which land health indicators would be directly impacted by each type of use or phenomena. Land uses or natural phenomena were considered to be causal factors where they were found at moderate or heavy levels in polygons not meeting or having problems meeting a standard, and the use was considered to impact indicators identified as a concern. Developments were analyzed based on summarizing the results of field evaluations from 3 previous LHAs, determining which types generally impacted which health indicators, and using GIS to locate the occurrence of these types of developments in polygons not meeting or meeting Standards with problems in the North Delta unit.
9. Recommendations to address land health problems were made for each Standard based on examination of the determinations, trends and causal factors at play.

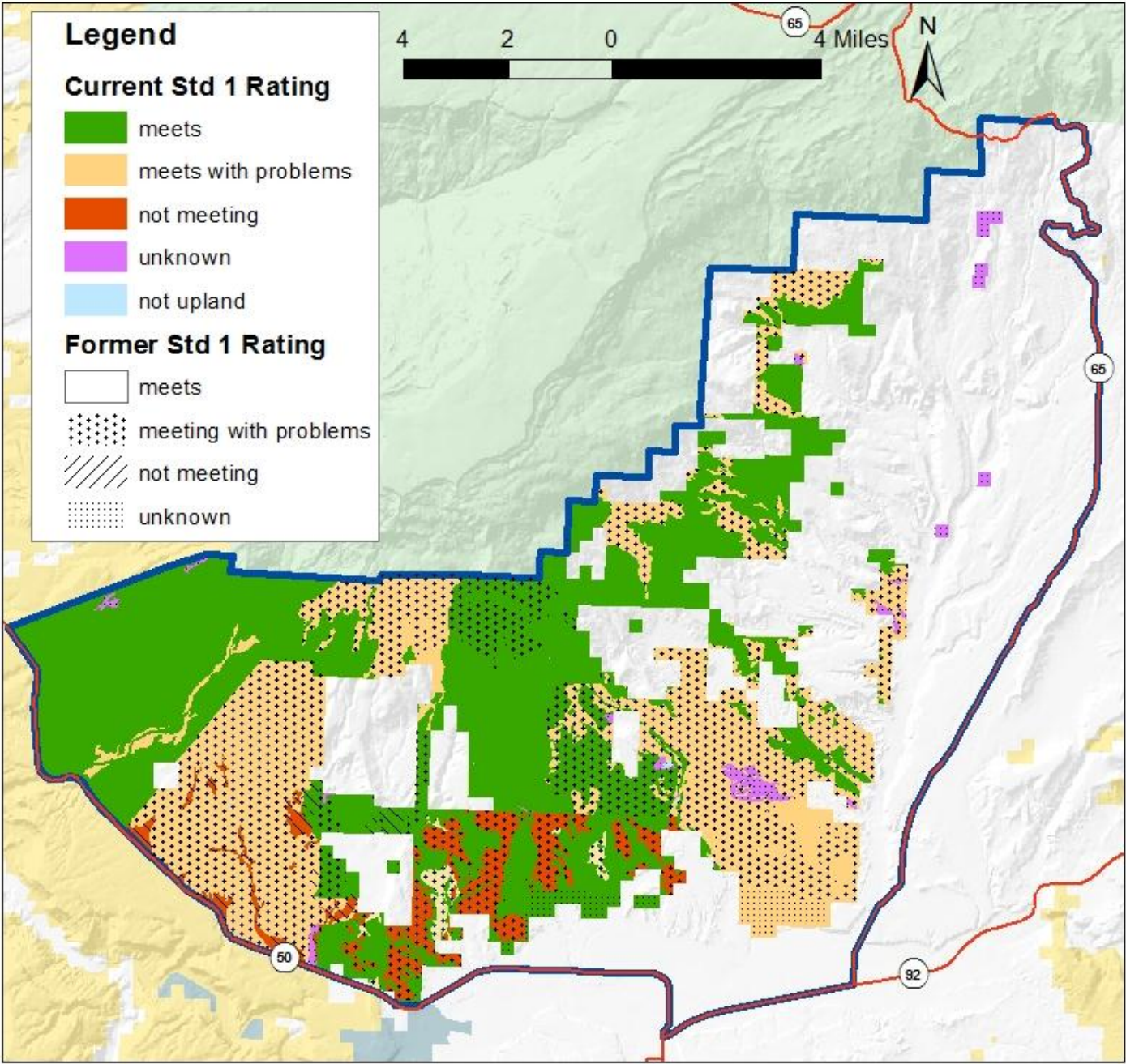
Figure 3. Map of study locations.



LAND HEALTH DETERMINATIONS FOR STANDARD 1 SOILS

Figure 4. Standard 1 Land Health Determinations map.

Land Health Determinations



	Standard 1 Determinations (acres / % of unit)				
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Upland
Current Rating	33,410 / 54%	23,165 / 37%	3,965/ 6%	888 / 2%	22 / <1%
Former Rating	29,684 / 48%	27,877 / 45%	1,273 / 2%	2,433 / 4%	22 / <1%

STANDARD 1 DETERMINATIONS: INTERPRETATION

Definition: To meet Standard 1, upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.

Determinations

Current land health determinations for Standard 1 are shown for each of the important categories (blue shading) within the North Delta landscape unit. Acreages of the “unknown” category are not included.

Category	Total Acres	% Meeting	% Meeting with Problems	% Not Meeting
Vegetation Types				
Pinyon-Juniper	8,927	73	27	0
Saltdesert Shrub	49,209	53	39	8
Allotments				
Alkali Flats	8,896	0	89	10
Deer Basin-Midway	11,690	49	25	26
Delta Pipeline	6,025	100	0	0
Dirty George	1,390	51	49	0
Petrie Mesa	2,838	71	21	0
Point Creek	1,614	99	0	0
South Branch	823	52	45	0
Ward Creek-Doughspoon	17,272	39	59	0
Wells Gulch	10,362	96	4	0
Special Management Areas				
Adobe Badlands WSA*	10,336	81	6	13
North Delta OHV Area	8,419	9	87	0
Adobe Badlands ONA/ACEC*	6,380	81	6	13

*These areas overlap with one another

Land Health Issues

This table shows acres where specific issues and concerns were recently verified for soil health indicators on lands Not Meeting or Meeting Standard 1 With Problems within the North Delta landscape unit.

Soil Indicator Issue	Acres	% of Unit
Low litter cover	14,701	24
High levels of bare soil	10,787	18
Low levels of cryptogam cover	8,973	15
Excessive space between plants	7,219	12
Low plant basal cover	6,225	10
Pedestals	381	1
Runoff drainages	381	1

STANDARD 1 DETERMINATIONS: INTEPRETATION

Trends

Trends for Standard 1 are shown for each of the important categories within the North Delta landscape unit. During trend determination, special consideration was given to the soil indicators which were cited as issues in the 2001 LHA.

	Total Acres	% Up	% Static	% Down	% Un-known*
North Delta LHA Area	61,449	17	65	6	12
Vegetation Types					
Pinyon-Juniper	8,927	0	100	0	0
Saltdesert Shrub	49,209	21	63	7	8
Allotments					
Alkali Flats	8,896	0	99	0	1
Deer Basin-Midway	11,690	8	60	27	5
Delta Pipeline	6,025	0	98	0	2
Dirty George	1,390	0	42	0	58
Petrie Mesa	2,838	0	98	0	2
Point Creek	1,614	0	62	0	38
South Branch	823	0	49	0	51
Ward Creek-Doughspoon	17,272	56	20	0	24
Wells Gulch	10,362	0	94	4	2
Special Management Areas					
Adobe Badlands WSA	10,336	0	88	10	2
North Delta OHV Area	8,419	87	0	0	13
Adobe Badlands ONA/ ACEC	6,380	0	84	14	2

*These are locations where long term trend data is not available.

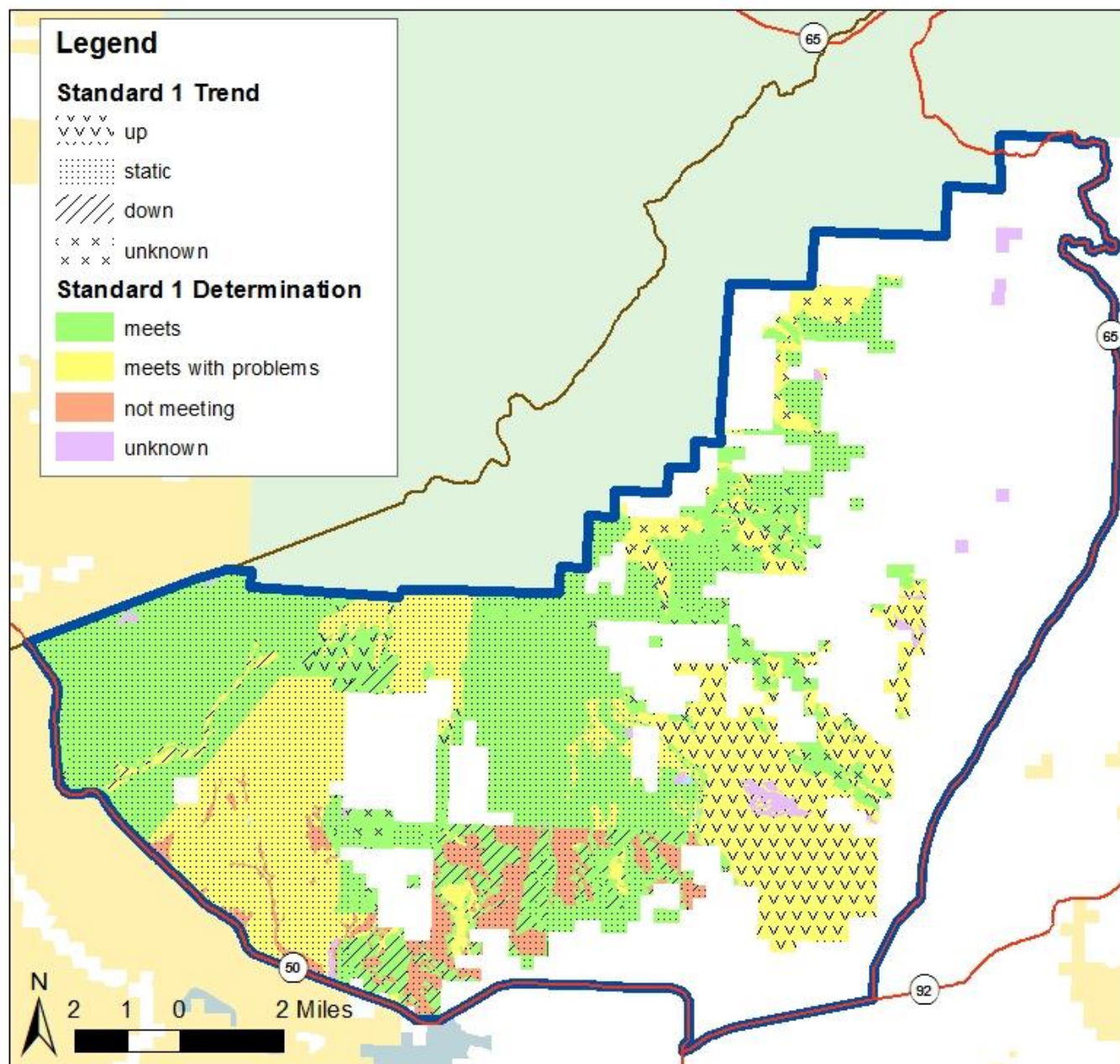
Discussion

Using the statistical t-tests, Standard 1 Determinations have improved slightly since the preceding Land Health Assessment of 2001-2002 (see Figure 4.) Lands rated as meeting Standard 1 have increased by 6%, and lands meeting Standard 1 with problems have decreased by 8%. However, lands not meeting have increased by 4%. Many of the lands determined to be meeting with problems and not meeting in the last LHA were vulnerable to increased soil erosion because of high levels of bare, unprotected soil, and low plant basal cover. In 2012 many of these areas remain in poor condition with high levels of bare soil and low basal cover as well as low litter cover and low cryptogam cover.

Alkali Flats, Deer Basin-Midway and Dirty George allotments all have 50% or greater of the area meeting with problems or not meeting. The specific indicators of concern are low litter cover and high levels of bare soil. These sites are largely on Mancos Shale and receive approximately 8" inches of precipitation annually. Disturbance on these sites is difficult to recover from before invasive species become dominant.

STANDARD 1 DETERMINATIONS: TRENDS

Figure 5. Standard 1 Land Health trends map.



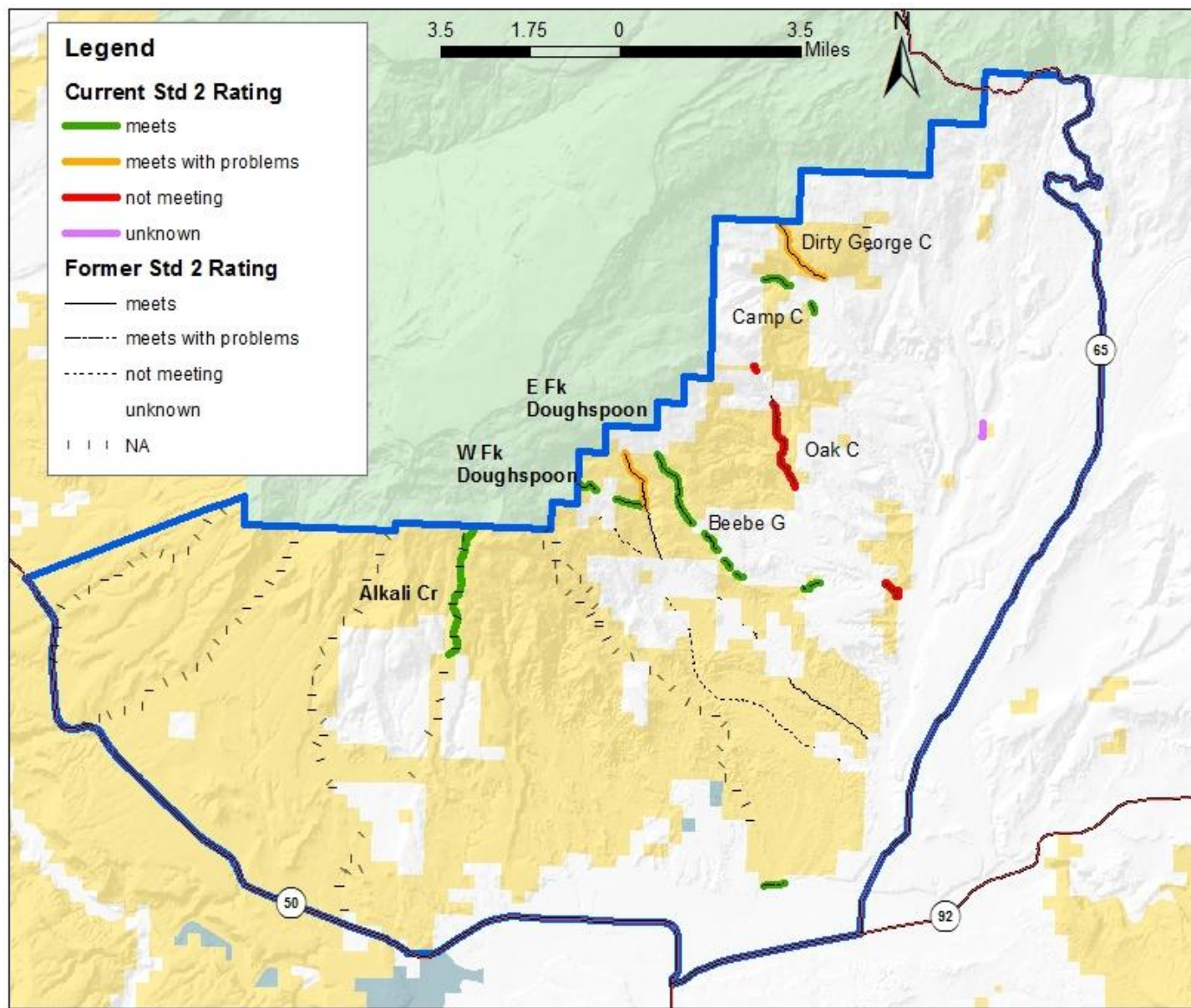
Trends for each Standard 1 Health Category
(% of acres in category)

	Lands which meet or exceed	Lands which meet with problems	Lands which are not meeting
Soil Trend Up	3%	42%	0%
Soil Trend Static	75%	48%	100%
Soil Trend Down	10%	2%	0%
Undetermined	12%	8%	0%

LAND HEALTH DETERMINATIONS FOR STANDARD 2 RIPARIAN

Figure 6. Standard 2 Land Health Determinations map.

Land Health Determinations



	Standard 2 Determinations (miles / % of riparian)			
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated
Current Rating	8.0 / 56%	3.5 / 24%	2.6 / 18%	0.2 / 2%
Former Rating	12.8 / 66%	0.4 / 2%	5.9 / 30%	0.2 / 2%

STANDARD 2 DETERMINATIONS: INTERPRETATION

Definition: To meet Standard 2, riparian systems function properly and have the ability to recover from major disturbances such as fire and 100 year floods. Riparian vegetation captures sediment, and provides forage, habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water slowly.

Determinations

Current land health determinations for Standard 2 are shown for each of the important categories within the North Delta landscape unit. Mileages of the “unknown” category are not included.

Category	Total Miles	% Meeting	% Meeting with Problems	% Not Meeting
Streams*				
Alkali Creek	2.9	100	0	0
Beebe Gulch	2.8	100	0	0
Camp Creek	0.8	100	0	0
Dirty George Creeks	2.2	0	100	0
East Fork Doughspoon	1.3	0	100	0
Lower Gunnison River	0.4	100	0	0
Oak Creek	2.6	0	0	100
West Fork Doughspoon	1.1	100	0	0
Allotments				
Deer Basin-Midway	2.1	100	0	0
Delta Pipeline	0.8	100	0	0
Dirty George	2.2	0	100	0
South Branch	0.7	100	0	0
Ward Creek-Doughspoon	8.2	52	16	32

*streams having less than 0.2 miles on BLM are not shown in this analysis

Land Health Issues

This table shows acres where specific issues and concerns were recently verified for riparian health indicators on lands Not Meeting or Meeting Standard 2 With Problems within the North Delta landscape unit.

Riparian Indicator Issue	Miles	% of Stream Miles
Channel sinuosity, width:depth ratio	5.4	38
Floodplain infrequently flooded	4.1	29
Riparian zone not widening or at maximum width	3.5	24
Water and sediment not in balance with channel	3.2	22
Vegetation cover inadequate to protect streambanks	1.9	13
Riparian plants in low vigor	1.9	13
Riparian vegetation not diverse	1.9	13
Riparian species don't indicate maintenance of soil moisture	1.9	13
Channel laterally and/or vertically unstable	1.9	13

STANDARD 2 DETERMINATIONS: INTERPRETATION**Trends**

Measured trend is classified as unknown for most of the streams in the North Delta landscape unit because prior monitoring studies had not been established. This has resulted because the streams are remote, BLM manages only short reaches, and the hydrology has been highly altered to the point where determining what is a legitimate stream is difficult. On Beebe Gulch and Alkali Creek where prior monitoring studies had been established and were reread, trend is static/stable. Changes in the Determinations from former to current reflect a closer review and removal of ephemeral channels from the data set used in 2001 because they don't contain riparian values.

Discussion

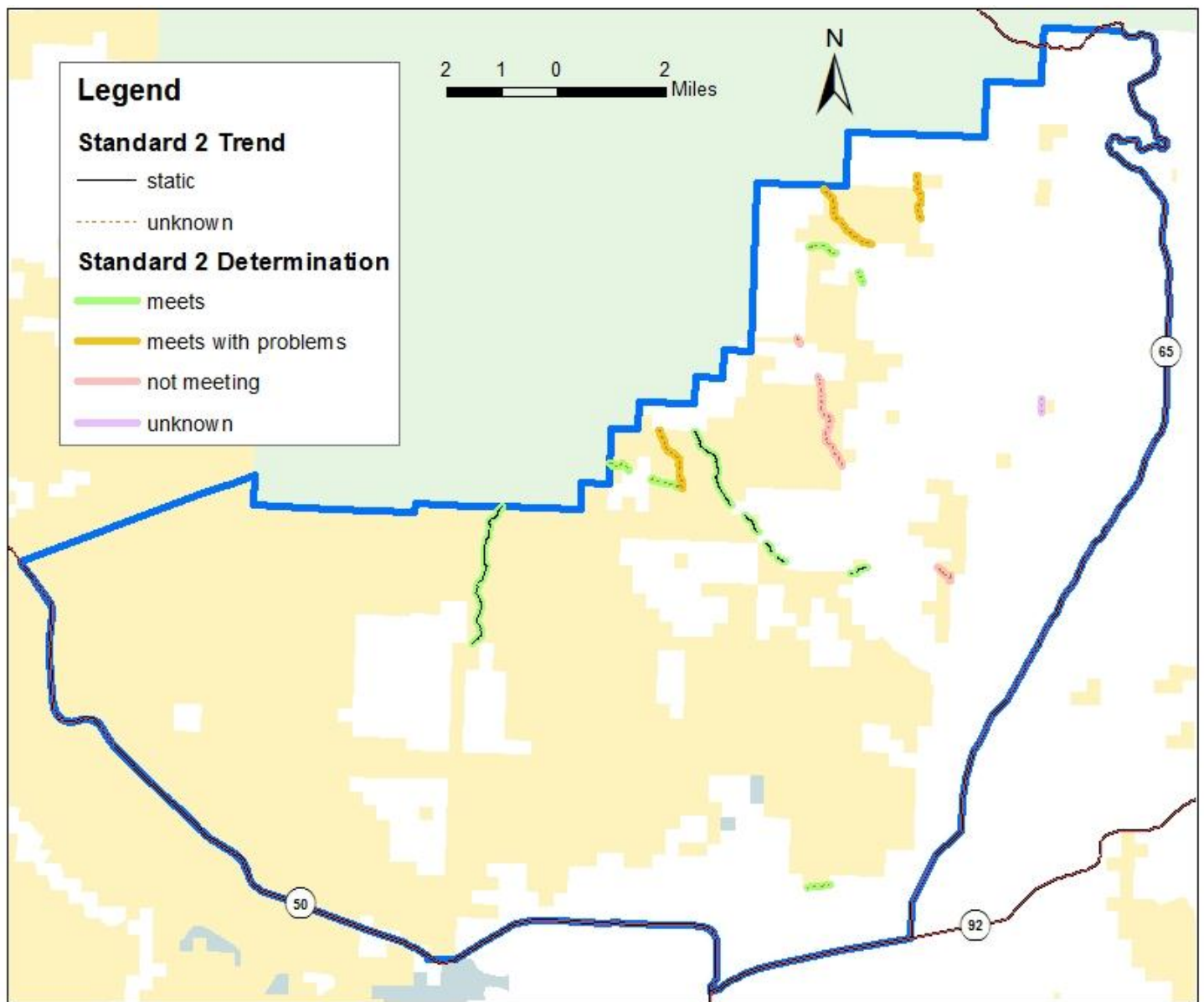
This LHA unit contains very few streams in contrast to other units. Part of this is due water rights holders manipulating stream headwaters and upper reaches on Grand Mesa to divert flow to natural channels which are then used to move the irrigation water downstream. This has resulted in some streams now being ephemeral, while others carry far more water than they would have historically. The streams which have been dry for so long they no longer support much riparian vegetation have been removed from consideration for Standard 2. The streams which convey irrigation water largely meet Standard 2 where those flows are moderated and consistent. Where flows are extreme or subject to large and irregular fluctuations, streams are meeting with problems or not meeting Standard 2.

The augmented flows have resulted in recurring problems for some of the Standard 2 indicators that relate to the stream channel. Channel morphology is typically altered on such streams, with imbalances in water and sediment being supplied to the channel. As a result, floodplains and flood processes are not functioning as they would have historically. Only along Oak Creek have these channel problems led to riparian vegetation concerns and a not meeting Standard 2 rating.

A short reach of the Gunnison River flows through BLM in the unit just upstream of the Hartland diversion above Delta. The reach has a broad floodplain with a mix of native and some nonnative riparian vegetation, including mature cottonwoods. Over the past 5 years, a framework to improve river hydrology has been established, with spring peak flows and flows designed to flood low-lying areas during high runoff years. Over time, these flows are expected to improve riparian conditions all along the Gunnison River.

STANDARD 2 DETERMINATIONS: TRENDS

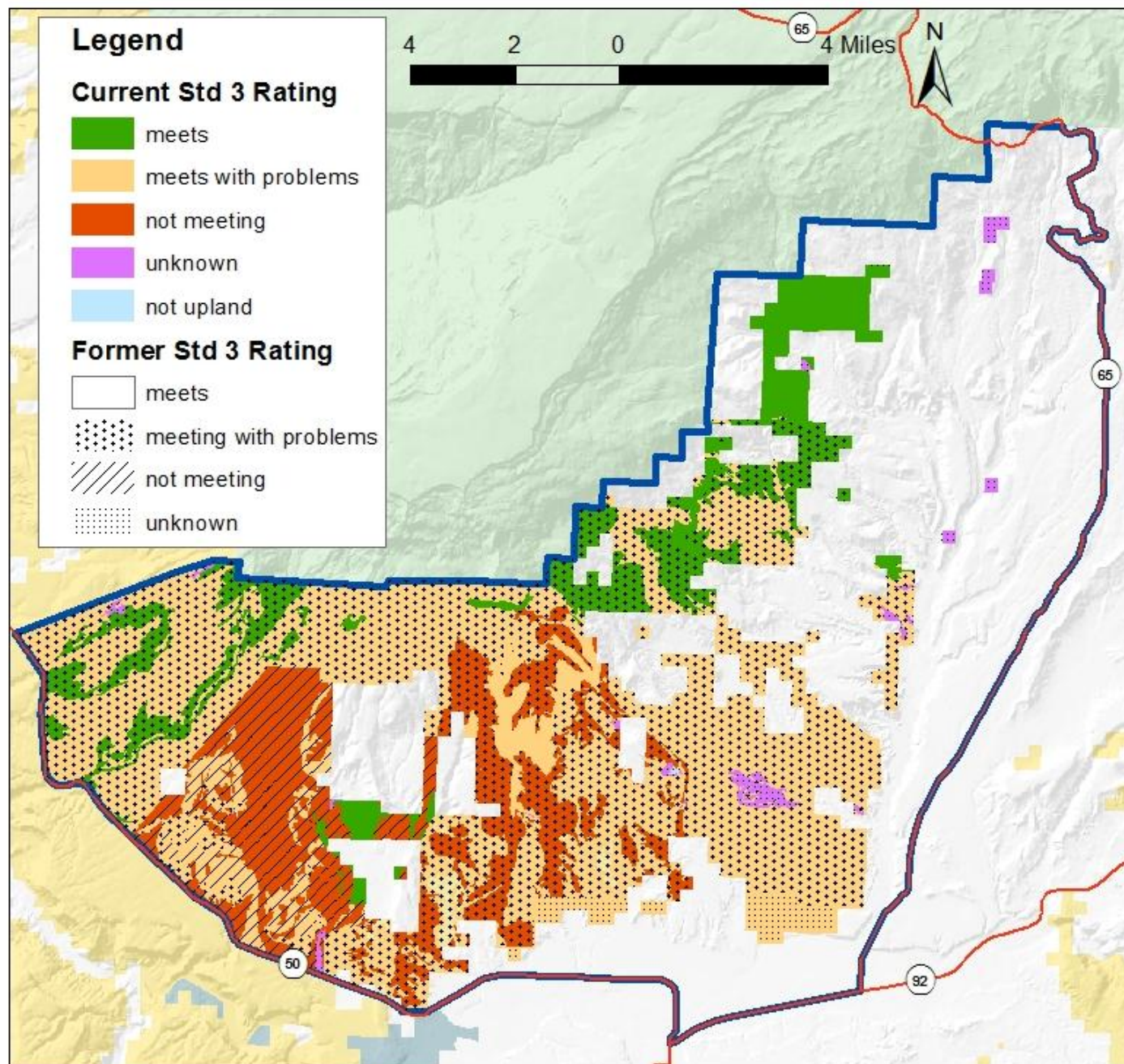
Figure 7. Standard 2 Land Health trends map.



	Trends for each Standard 2 Health Category (% of miles in category)		
	Lands which meet or exceed	Lands which meet with problems	Lands which are not meeting
Riparian Trend Up	0%	0%	0%
Riparian Trend Static	72%	0%	0%
Riparian Trend Down	0%	0%	0%
Undetermined	29%	100%	100%

LAND HEALTH DETERMINATIONS FOR STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES

Figure 8. Standard 3 Land Health Determinations map.



	Standard 3 Determinations (acres / % of unit)				
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Upland
Current Rating	9,951 / 16%	37,270 / 60%	13,318 / 22%	888 / 2%	22 / <1%
Former Rating	5,254 / 9%	44,568 / 73%	9,012 / 15%	2,433 / 3%	22 / <1%

STANDARD 3 DETERMINATIONS: INTERPRETATION

Definition: To meet Standard 3, healthy productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species' and habitat's potentials. Plants and animals are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.

Determinations

Current land health determinations for Standard 3 are shown for each of the important categories (blue shading) within the North Delta landscape unit. Acreages of the "unknown" category are not included.

Category	Total Acres	% Meeting	% Meeting with Problems	% Not Meeting
Vegetation Types				
Pinyon-Juniper	8,927	57	43	0
Saltdesert Shrub	49,209	6	67	27
Allotments				
Alkali Flats	8,896	0	35	64
Deer Basin-Midway	11,690	0	73	26
Delta Pipeline	6,025	2	51	47
Dirty George	1,390	100	0	0
Petrie Mesa	2,838	0	71	27
Point Creek	1,614	30	0	62
South Branch	823	97	0	0
Ward Creek-Doughspoon	17,272	23	74	0
Wells Gulch	10,362	28	72	0
Special Management Areas				
Adobe Badlands WSA*	10,336	1	64	35
North Delta OHV Area	8,419	0	96	0
Adobe Badlands ONA/ACEC*	6,380	0	74	26

*These areas overlap with one another

Land Health Issues

This table shows acres where specific issues and concerns were recently verified for habitat health indicators on lands Not Meeting or Meeting Standard 3 With Problems within the North Delta landscape unit.

Native Plant and Animal Community Indicator Issue	Acres	% of Unit
Exotic plants	40,166	65
Low perennial cool season grass cover	33,270	54
Low perennial forb cover	27,124	44
Low native vegetation diversity	26,660	43
Low shrub vigor	18,439	30
Low perennial warm season grass cover	15,019	24
Low shrub cover	11,560	19
Heavy shrub hedging	10,777	18
Noxious weeds	4,786	8

STANDARD 3 DETERMINATIONS: INTERPRETATION

Trends

Trends for Standard 3 are shown for each of the important categories within the North Delta landscape unit. During trend determination, special consideration was given to the habitat indicators which were cited as issues in the 2001 LHA.

	Total Acres	% Up	% Static	% Down	% Unknown
North Delta LHA Area	61,449	0	30	55	15
Vegetation Types					
Pinyon-Juniper	8,927	0	57	43	0
Saltdesert Shrub	49,209	0	27	61	12
Allotments					
Alkali Flats	8,896	0	0	99	1
Deer Basin-Midway	11,690	0	8	87	5
Delta Pipeline	6,025	0	0	70	30
Dirty George	1,390	0	42	0	58
Petrie Mesa	2,838	0	98	0	2
Point Creek	1,614	0	0	62	38
South Branch	823	0	49	0	51
Ward Creek-Doughspoon	17,272	0	20	56	24
Wells Gulch	10,362	0	98	0	2
Special Management Areas					
Adobe Badlands WSA	10,336	0	22	63	15
North Delta OHV Area	8,419	0	0	87	13
Adobe Badlands ONA/ ACEC	6,380	0	28	55	17

*These are locations where long term trend data is not available.

Discussion

A majority of this landscape unit has concerns and issues with Standard 3. These concerns are most pronounced in saltdesert shrub vegetation and in the Alkali Flats, Deer Basin-Midway, Delta Pipeline, Petrie Mesa, and Point Creek allotments. The status of vegetation in the Adobe Badlands ONA/ ACEC is of particular concern, since vegetation reflects habitat conditions important for maintaining the ACEC's key values. The indicators of greatest concern within the LHA unit include exotic plants, low perennial cool season grass cover, low perennial forb cover, low native plant diversity, areas of low perennial warm season grass cover, low shrub vigor and cover, and heavy shrub hedging.

Exotic annuals dominate the vegetation community in many of the lower-elevation areas in the North Delta landscape. Halogeton (*Halogeton glomeratus*) is by far the most abundant weed, although cheatgrass (*Bromus tectorum*), annual wheatgrass (*Eremopyrum triticeum*), purple mustard (*Chorispora tenella*), filaree (*Erodium cicutarium*) and European madwort (*Alyssum simplex*) are also common throughout the unit. Russian knapweed (*Acroptilon repens*) and tamarisk (*Tamarix* spp.) are often present in disturbed drainages or gullies. The annual weeds are dominant in areas where the mature, perennial vegetation has been reduced. In saltdesert shrub areas where the native perennial vegetation is present, exotics are typically present but in far lesser amounts, suggesting a tie between health of the

STANDARD 3 DETERMINATIONS: INTERPRETATION

native community and the ability of the annuals to take over. A number of perennial vegetation concerns are widespread across the unit. While cool season perennial grasses should make up 25% of the production on an excellent condition site, in many areas in the unit they are absent or make up less than 1% cover. Perennial forb cover is also absent or very low on nearly half of the landscape, as is native plant diversity. Low shrub cover and poor shrub condition, often accompanied by heavy browse use is a common situation on many shadscale sites.

The Ecological Site Descriptions developed by the Natural Resource Conservation Service are still in draft form for the North Delta LHA Area, and many date back to the 1970s. Ecological Site Descriptions are helpful for understanding the potential plant community that can be supported on a given soil type. The Stony Saltdesert Ecological Site is the most widespread Ecological Site Type in the North Delta Unit. It describes a potential plant community where annual plant production is dominated evenly by shrubs and perennial grasses, with shadscale being the dominant shrub and galleta the dominant grass. However, cool season perennial grasses should be a notable component of the site, along with a variety of shrubs, and several forbs. This Ecological Site information underlines the issues with perennial vegetation identified above.

Large areas of the North Delta landscape were identified as having problems or not meeting Standard 3 in the original LHA from 2001. Measured trend data since that time indicates conditions have been static to downward on these lands over the past 12 years. However, lands which meet Standard 3 are typically showing static trend, indicating little concern in those areas. Trend interpretations were largely based on the indicators which were documented to have problems in the 2001 LHA. This data provides no evidence for new concerns in the North Delta landscape. Instead, the data suggest that management and conditions in the North Delta landscape over the past 12 years have not been effective at addressing many of the vegetation problems observed in 2001, and some are getting worse.

With the above concerns for vegetation as having problems or not meeting Standard 3 and trends as static to downward on these lands over the past 12 years, general wildlife habitat condition appears to be in a decline, particularly for pronghorn.

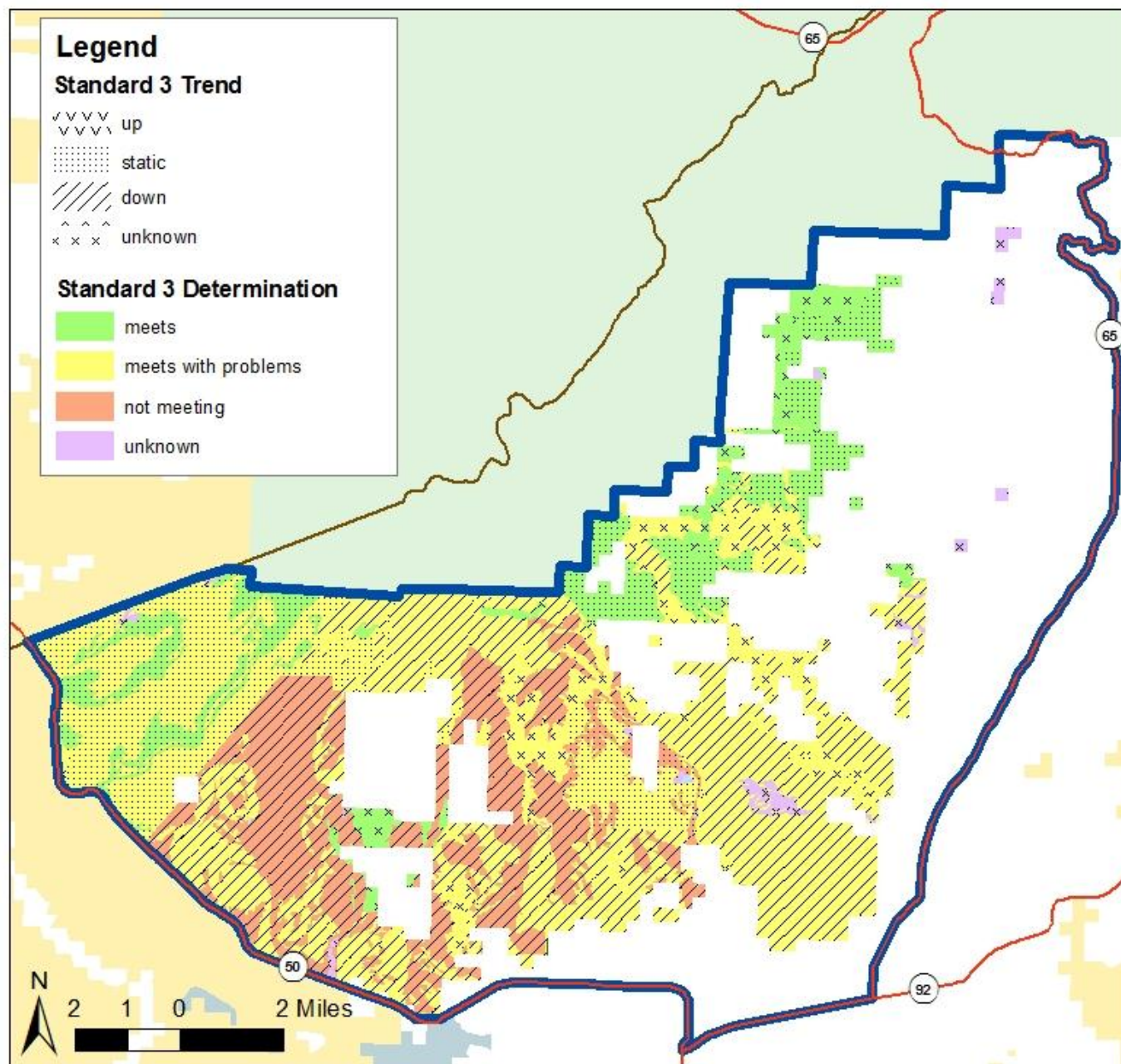
According to Colorado Parks and Wildlife (CPW 2014a) populations of pronghorn are of concern in this area, and appear to be declining (CPW 2014a). The A-27 pronghorn herd did well historically in the area for several decades and probably numbered near 300 animals as recently as the late 1990's. However, in recent years, the herd has dramatically declined. The probable reasons for decline in this population include lack of available water, habitat degradation, noxious weed invasions, drought impacts, poor fawning cover, blue tongue and epizootic hemorrhagic disease (BT/EHD), expanded highway development, and predation. CPW studies of does during fawning and late summer are ongoing to monitor survival, range, habitat selection, and mortality causes, and to learn more about the impacts of BT/EHD. Initial findings show 95% of sampled resident animals testing positive for exposure.

Invasion of noxious weeds is an important component of habitat degradation for the pronghorn population, with halogeton the primary invasive species. This species which was introduced from Eurasia is very well adapted to the dry, saline soils of the desert. It is known to be very toxic to domestic cattle and sheep, and therefore is probably toxic to pronghorn.** Halogeton toxicity for ungulates is minimized by consumption of other digestible material, however, there is some concern that halogeton consumption during lactation periods may affect fawn growth and survival.

*A project was initiated by CPW in early 2012 to learn more about the impacts of BT/EHD. Of the 20 local pronghorn tested for BT/EHD, 95% tested positive for exposure. Twenty-four pronghorn were translocated from eastern Colorado; each was marked, tested for BT/EHD and vaccinated with the same vaccine as the local animals. Seventeen of the translocated pronghorn tested positive for exposure to BT/EHD.

STANDARD 3 DETERMINATIONS: TRENDS

Figure 9. Standard 3 Land Health trends map.



Trends for each Standard 3 Health Category (% of acres in category)

	Land which meet or exceed	Lands which meet with problems	Lands which are not meeting
Vegetation Trend Up	0%	0%	0%
Vegetation Trend Static	74%	28%	6%
Vegetation Trend Down	0%	56%	94%
Undetermined	26%	16%	0%



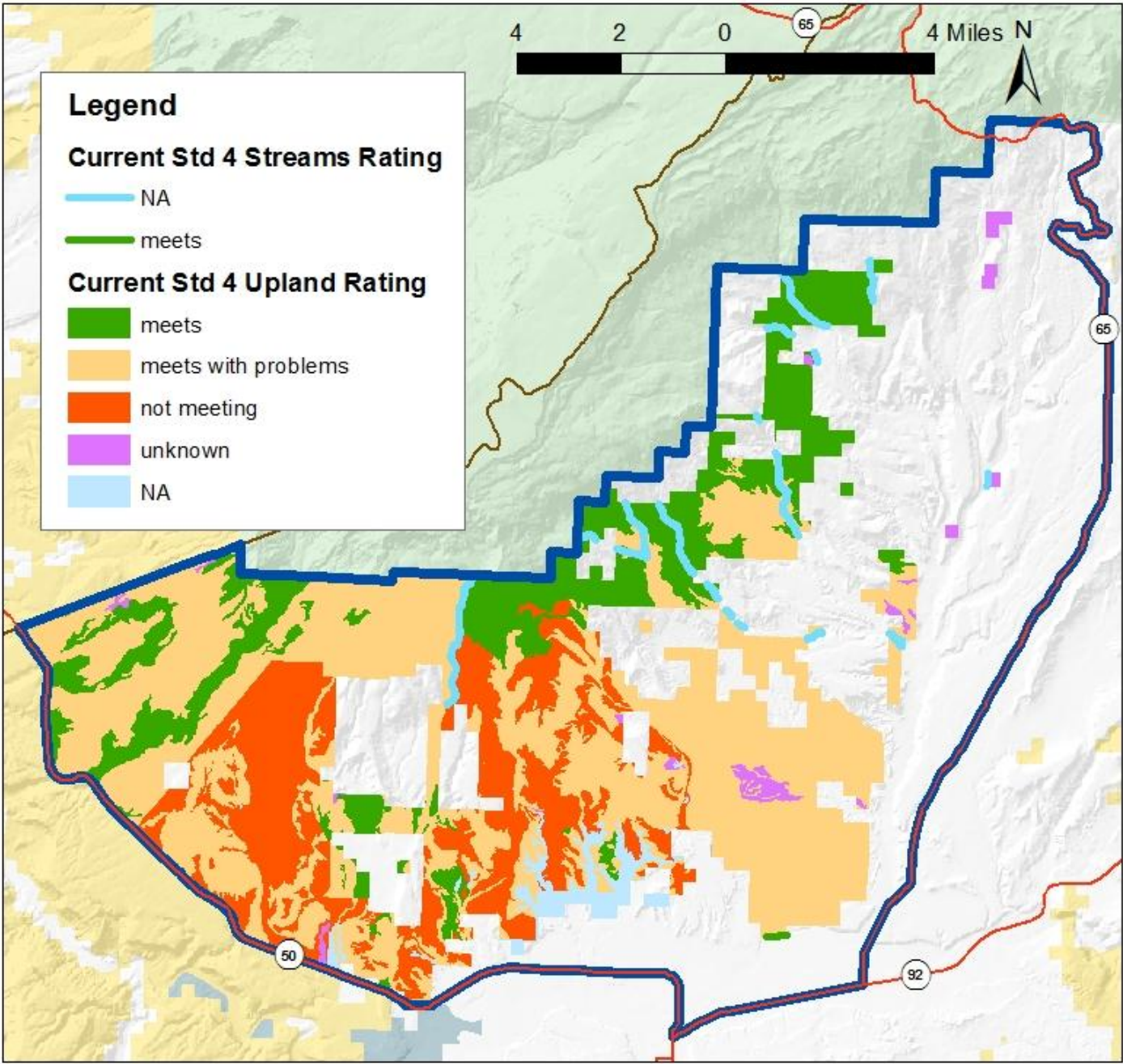
Upland vegetation transect showing some of the vegetation concerns that were frequently encountered in the North Delta unit. These include dominance by halogeton (an annual invasive species), low cover of perennial vegetation, particularly cool season perennial grasses, shrubs, and forbs.

LAND HEALTH DETERMINATIONS FOR STANDARD 4

SPECIAL STATUS SPECIES

Figure 10. Standard 4 Land Health Determinations map.

Land Health Determinations



Standard 4 Determinations					
(acres / % of unit above, stream miles / % below shown for current only)					
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Applicable
Current Rating	12,844 / 20% 0.4 / 3%	33,798/ 55% 0 / 0%	12,324 / 20% 0 / 0%	888 / 2% 0 / 0%	1,596 / 3% 13.9 / 97%
Former Rating	61,289 / 100%	0 / 0%	0 / 0%	0 / 0%	0 / 0%

STANDARD 4 DETERMINATIONS: INTERPRETATION

Definition: To meet Standard 4, special status, threatened, and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.

¹TES Species– Special Status Species which includes federally threatened, endangered, proposed, and candidate species and BLM sensitive species

Determinations

Current land health determinations for Standard 4 are shown for each of the important categories (blue shading) within the North Delta landscape unit. Acreages of the “unknown” category are not included.

Category	Total Acres	% Meeting	% Meeting with Problems	% Not Meeting
Vegetation Types				
Pinyon-Juniper	8,927	73	27	0
Salt-desert Shrub	49,209	8	64	25
Allotments				
Alkali Flats	8,896	0	35	64
Deer Basin-Midway	11,690	5	56	26
Delta Pipeline	6,025	26	28	47
Dirty George	1,390	100	0	0
Petrie Mesa	2,838	0	71	27
Point Creek	1,614	38	62	0
South Branch	823	97	0	0
Ward Creek-Doughspoon	17,272	26	72	0
Wells Gulch	10,362	32	67	0
Special Management Areas				
Adobe Badlands WSA	10,336	13	40	35
North Delta OHV Area	8,419	0	96	0
Adobe Badlands ONA/ ACEC	6,380	2	53	26

Land Health Issues on Lands Not Meeting or Meeting Standard 4 With Problems

This table shows acres where specific issues and concerns were recently verified for TES habitat (mainly Colorado hookless cactus) health indicators on lands Not Meeting or Meeting Standard 4 With Problems. This list differs from Standard 3 because not all of the vegetation indicators affect Colorado hookless cactus.

TES Habitat Indicator Issue	Acres	% of Unit
exotic plants compete/degrade habitat	38,211	62
low perennial cool season grass cover	31,696	52
low perennial forb cover	24,120	39
low native vegetation diversity	25,230	41
low shrub vigor	15,435	25
low shrub cover	11,560	19
noxious weeds	4,786	8

STANDARD 4 DETERMINATIONS: INTERPRETATION

Trends

Trends for Standard 4 uplands are shown for each of the important categories within the North Delta landscape unit. During trend determination, special consideration was given to the TES habitat indicators which were cited as issues in the 2001 LHA. Trends for Standard 4 streams are unknown because of lack of prior studies.

	Total Acres	% Up	% Static	% Down	% Un-known or NA
North Delta LHA Area	61,449	0	29	49	22
Vegetation Types					
Pinyon-Juniper	8,927	0	51	0	49
Saltdesert Shrub	49,209	0	27	61	22
Allotments					
Alkali Flats	8,896	0	99	0	1
Deer Basin-Midway	11,690	0	8	53	39
Delta Pipeline	6,025	0	0	74	26
Dirty George	1,390	0	42	0	58
Petrie Mesa	2,838	0	98	0	2
Point Creek	1,614	0	0	62	38
South Branch	823	0	49	0	51
Ward Creek-Doughspoon	17,272	0	56	20	24
Wells Gulch	10,362	0	93	0	7
Special Management Areas					
Adobe Badlands WSA*	10,336	0	22	53	25
North Delta OHV Area	8,419	0	0	87	13
Adobe Badlands ONA/ACEC*	6,380	0	28	52	20

*These areas overlap with one another

Discussion

Standard 4 Determinations have changed since the preceding Land Health Assessment of 2000-2001 (see Figure 10.) Acreage of lands not meeting and meeting Standard 4 with problems has increased greatly, largely as a result of a new, more intensive approach for this standard than was used in the past. Now, Standard 4 determinations are more closely tied with Standard 3 determinations which can indicate habitat concerns where there are TES species, especially when detailed population information is not known. In the past assessment, lands were typically judged as meeting Standard 4 when specific information on TES species was lacking. Approximately 22% of the area allotted for grazing is now found to be meeting for Standard 4, while a majority of the area (78%) is either meeting with problems (57%) or not meeting (21%).

The Colorado hookless cactus (a federally Threatened species) is the TES species most central to the current and former Standard 4 rating for uplands in this unit, while the endangered razorback sucker is the main Standard 4 consideration for waterways. Additional surveys for Colorado hookless cactus in recent years have increased the area across the unit and increased the known occurrences

STANDARD 4 DETERMINATIONS: INTERPRETATION

by 2,978 individuals, with 90 population areas that have no individual count data. Populations in the area probably exceed 3000 individuals, with some suitable habitat still unsurveyed. Areas with known occurrences of Colorado hookless cactus were determined to not meet Standard 4 (61.3%), or meet with problems (30.7%) based on increasingly degraded habitat from exotic annuals and/or decreasing native species cover and composition. Only 4.3% of occurrences were found to be on lands meeting land health standards as shown in the table below. Only a short segment of the Lower Gunnison River with razorback sucker habitat is applicable to, and was determined to meet Standard 4, while the other streams in the unit do not contain TES habitat or species.

Land Health Status	# of Colorado Hookless Cactus Occurrences	%
Meets	54	4.3
Meets with Problems	764	61.3
Not Meet	382	30.7
Unknown/Not Evaluated	46	3.7

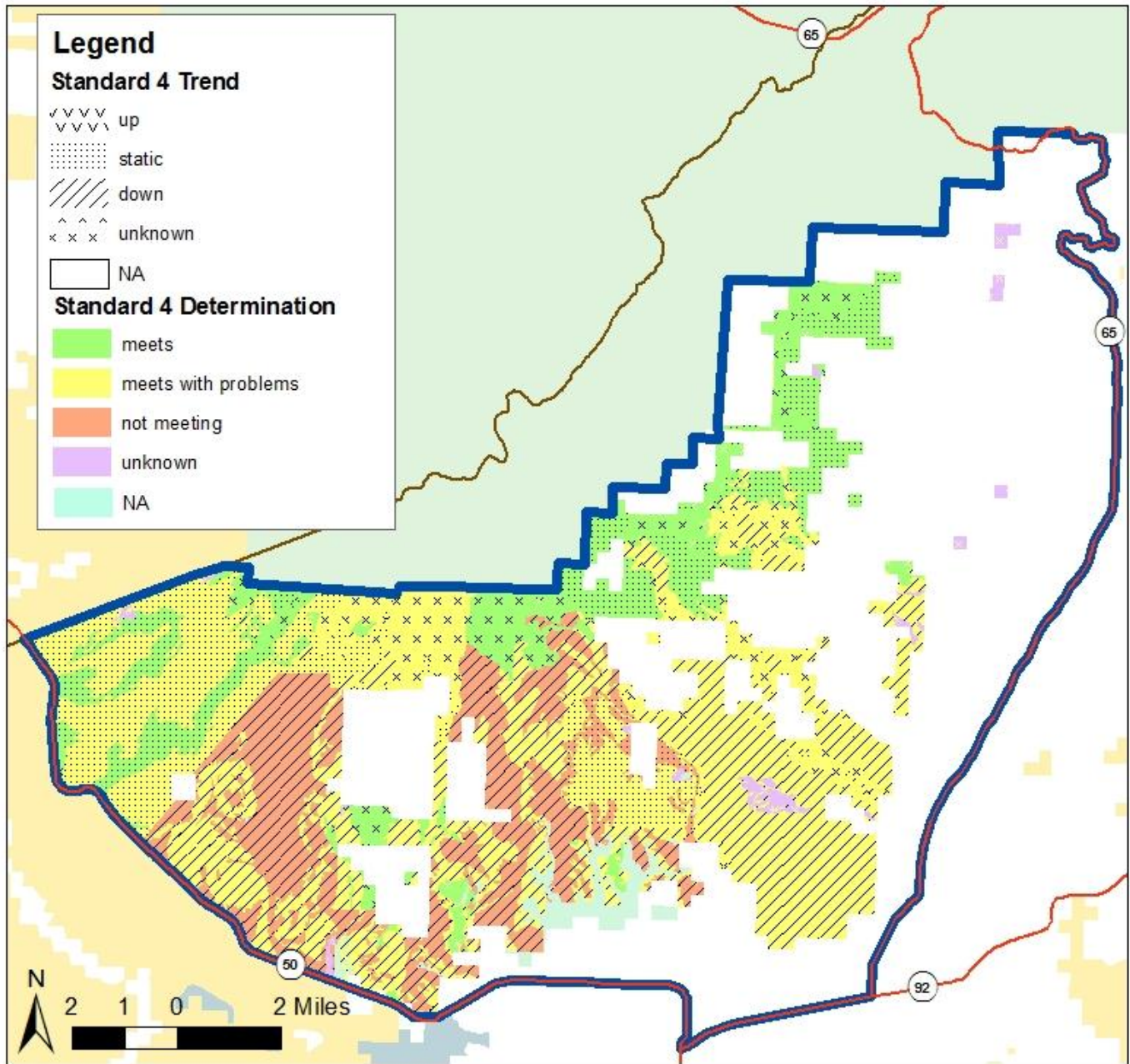
Some of the changes in determinations are based on TES concerns which have emerged over the past decade. For example, additional special status species have been added for consideration such as Desert bighorn sheep, kit fox and white tail prairie dogs which are all now BLM sensitive species. Areas of degraded bighorn habitat and/or areas with high probability of interaction (disease transmission) between domestic and wild sheep, and degraded habitat for prairie dogs or plague-killed colonies were given a lower Standard 4 determination. Desert bighorn are a concern in six domestic sheep allotments. While none of the domestic sheep allotments are located within or adjacent to bighorn sheep range (as mapped by CPW), two domestic sheep allotments are considered “moderate probability of interaction” for disease transmission (Alkali Flats, Wells Gulch) and four domestic sheep allotments are considered “some probability of interaction” for disease transmission (Deer Basin/Midway, Delta Pipeline, Petrie Mesa, Point Creek). As shown in the following table, these six allotments were generally found to be not meeting or meeting with problems (all six), with downward trend (four of six) for both Standard 3 and 4.

Allotment	Probability of Interaction with Desert Bighorn	Standard 3		Standard 4	
		Meeting with Problems or Not Meeting	Trend	Meeting with Problems or Not Meeting	Trend
Alkali Flats	Moderate	99%	Downward	99%	Static
Wells Gulch	Moderate	72%	Static	67%	Static
Deer Basin-Midway	Some	99%	Downward	82%	Downward
Delta Pipeline	Some	100%	Downward	75%	Downward
Petrie Mesa	Some	98%	Static	98%	Static
Point Creek	Some	62%	Downward	62%	Downward

Regarding prairie dogs, CPW reports that there have been extensive die offs due to plague within the last 5-10 years, with recent increases in prairie dog populations in the past two years. In the mid 1990's there were estimated to be approximately 100 kit fox in Colorado, with a few documented in the Wells Gulch /Mesa/Delta county line area east of Highway 50 (CPW 2014b). At that time there were so few kit fox, the population was thought to not be self-sustaining. In extensive sampling efforts by CPW in 2008-2009 it appeared that kit foxes no longer occupied Colorado. Additional sampling by CPW in 2012-2013 in the same area only detected coyotes and red fox, indicating that kit fox are not

STANDARD 4 DETERMINATIONS: TRENDS

Figure 11. Standard 4 Land Health trends map.



Trends for each Standard 4 Health Category (% of acres in category)

	Lands which meet or exceed	Lands which meet with problems	Lands which are not meeting
TES Indicator Trend Up	0%	0%	0%
TES Indicator Trend Static	57%	30%	6%
TES Indicator Trend Down	0%	55%	94%
Trend Undetermined	43%	15%	0%

STANDARD 4 DETERMINATIONS: TRENDS

Photo from www.rshantz.com, Hidalgo, New Mexico, 2009.

currently occupying the area. Based on current CPW habitat modeling it appears that Delta County is on the fringe of what is now considered kit fox range.

Birds of Conservation Concern (USFWS, 2008) and breeding bird surveys (Boyle 2012) were conducted for the first time in the LHA unit and used to incorporate migratory bird concerns and evaluate Standard 4. The presence of exotic bird species or brown-headed cowbirds (nest parasites) was given emphasis while assessing Standard 4.

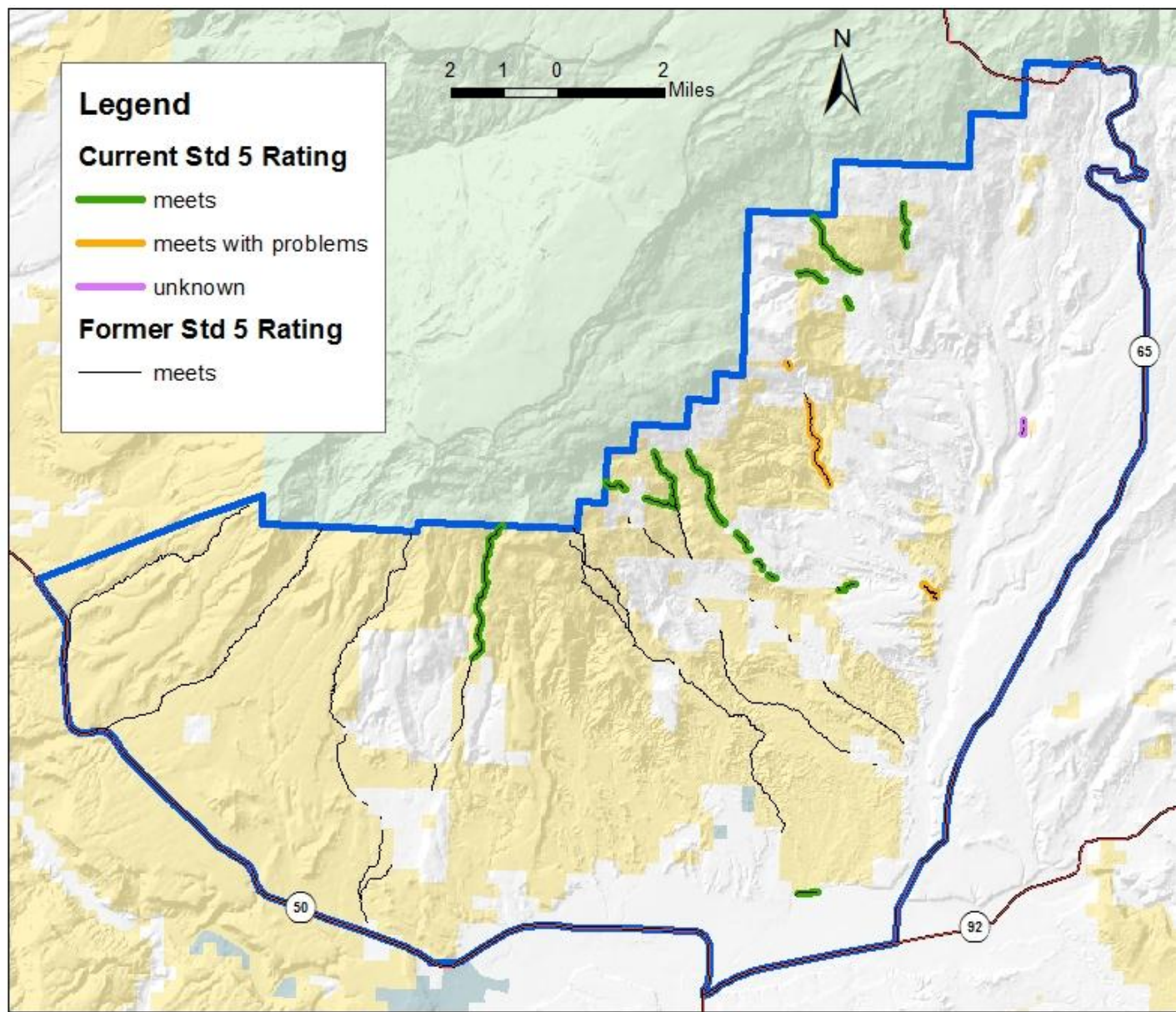
A small portion of the area is composed of pinyon-juniper (15%). The majority of Pinyon-Juniper studies are meeting Standard 4 with problems, with weeds generally increasing. The majority of Saltdesert Shrub vegetation studies either do not meet (25%), or meet with problems (64%) for Standard 4. This community generally has problems with invasive weeds degrading habitat quality for TES. The only clear trend in this habitat type is one of increasing cover of exotic plants. With the widespread issue of increasing cover of exotic plants, it may be difficult for native wildlife to thrive, especially special status species that are already having issues.

The Adobe Badlands ACEC was found to be meeting with problems or not meeting for Standard 4 (downward or static trend). Weeds generally degrade TES habitat quality, and native plants show overall declines which increasingly threatens TES habitat quality over time. Kit fox which were present in western Colorado and the North Delta area in low numbers in the 1990s now appear to be extirpated from the state.

LAND HEALTH DETERMINATIONS FOR STANDARD 5 WATER QUALITY

Figure 12. Standard 5 Land Health Determinations map.

Land Health Determinations



	Standard 5 Determinations (miles/ % of streams)			
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated
Current Rating	11.1 / 78%	3.0 / 21%	0 / 0%	0.2 / 1%
Former Rating	57.8 / 100	0	0	0

STANDARD 5 DETERMINATIONS: INTERPRETATION

Definition: To meet Standard 5, the water quality of all water bodies, including groundwater where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado.

Determinations

Current land health determinations for Standard 5 are shown for each of the important categories within the North Delta landscape unit. Mileages of the “unknown” category are not included., nor are streams having less than 0.2 miles on BLM.

Category	Total Miles	% Meeting	% Meeting with Problems	% Not Meeting
Streams				
Alkali Creek	2.9	100	0	0
Beebe Gulch	2.8	100	0	0
Camp Creek	0.8	100	0	0
Dirty George Creeks	2.2	100	0	0
East Fork Doughspoon	1.3	100	0	0
Lower Gunnison River	0.4	100		0
Oak Creek	2.6	0	100	0
West Fork Doughspoon	1.1	100	0	0
Allotments				
Deer Basin-Midway	2.1	100	0	0
Delta Pipeline	0.8	100	0	0
Dirty George	2.2	100	0	0
South Branch	0.7	100	0	0
Ward Creek-Doughspoon	8.2	63	37	0

Land Health Issues

This table shows the water quality indicators which have issues on streams not meeting or having problems with Standard 5.

Water Quality Indicator Issue	Miles	% of Stream Miles
Fecal coliform contamination	1.9	13
Water and sediment not in balance with channel	1.9	13
Vegetation cover inadequate to protect streambanks	1.9	13
Macroinvertebrates EPT	1.9	13
Macroinvertebrates HBI	1.9	13
Channel laterally and vertically unstable	1.9	13
E. coli contamination	0.4	3
Sediment	0.4	3

STANDARD 5 DETERMINATIONS: TRENDS**Trends**

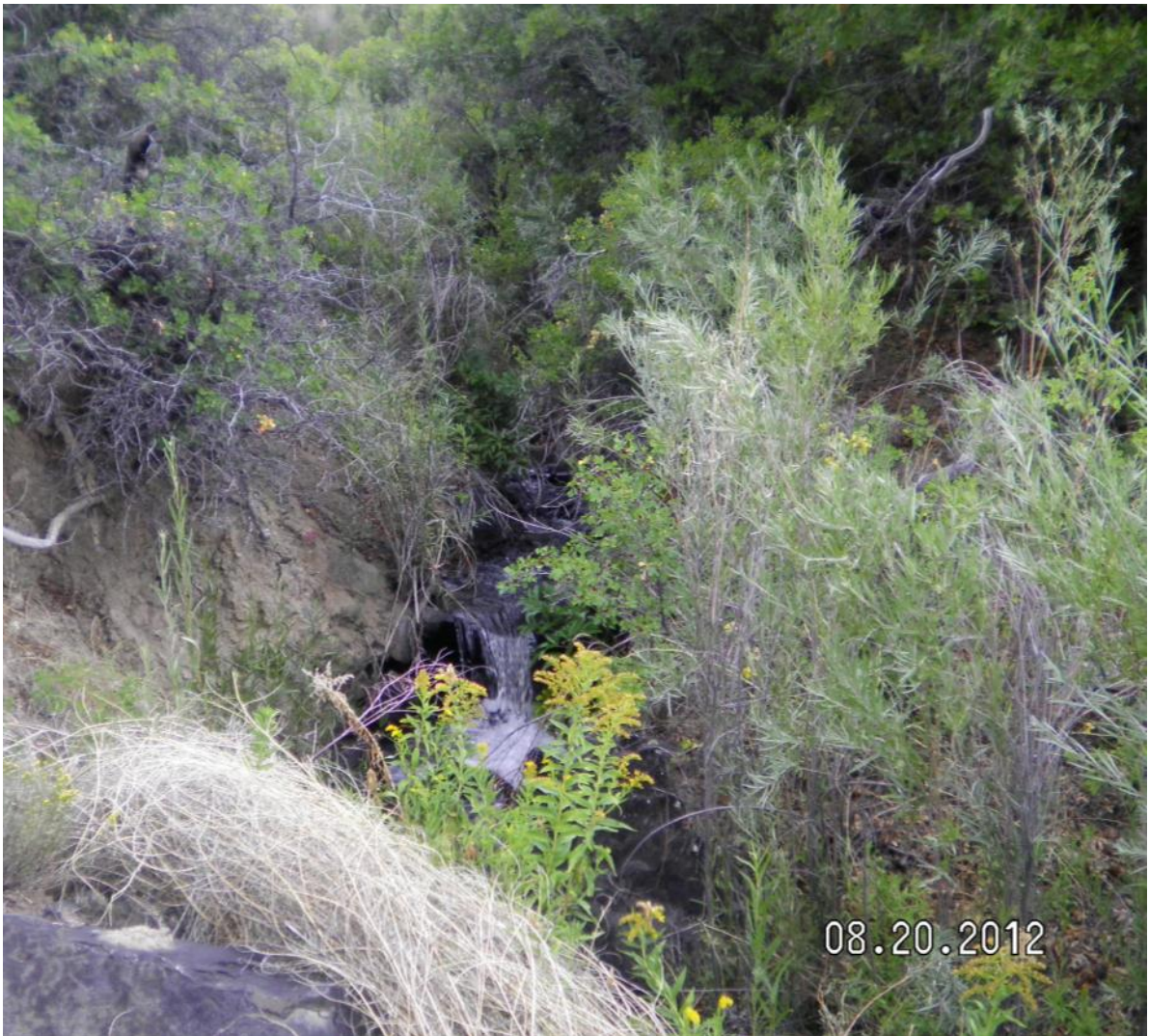
Measured trend is categorized as unknown for the streams in the North Delta landscape unit because prior monitoring studies had not been established. This has resulted because the streams are remote, BLM manages only short reaches, and the hydrology has been highly altered to the point where determining what is a legitimate stream is difficult. Changes in the Determinations from former to current reflect a closer review and removal of ephemeral channels from the data set used in 2002, and a switch in methodology to focus on sampled water quality and macroinvertebrates rather than using upland soil characteristics.

Discussion

The only water quality parameter of concern on several of the creeks was fecal coliform. The State actually uses *E. coli* as the water quality standard but, fecal coliform can be used as an indicator of bacterial levels in the stream. In both BeeBee Gulch and Oak Creek fecal coliform levels were nearly exceeding the water quality standard.

All three sites met attainment for aquatic life use, but Oak Creek was rated in poor condition, indicating impairment of some kind. The total lack of entire functional groups of macroinvertebrates and a lack of water quality exceedances indicate a lack of flows may be impairing the macroinvertebrate community.

Alkali creek had the best overall conditions using the HBI and EPT metrics. Beebee Gulch was also in good condition while Oak Creek scored low in both HBI and EPT with a poor overall macroinvertebrate community. Since there were no concerns with water quality at any of the sites the macroinvertebrates in these streams seem to be most impacted by the existence of stream flows.



Alkali Creek looking upstream. This small stream is rated as meeting Standard 2 and Standard 5. It is considered to be in Proper Functioning Condition with a stable trend.

STANDARD 1 SOILS: CAUSAL FACTORS

Definition: Causal factors are those uses or natural phenomena which were observed at moderate or higher levels on lands with health problems. Development analysis identifies possible links between developments and soil health.

Causal Factors

In addition to the natural limitations imposed by the variable semiarid climate, a variety of factors influence soil conditions and the resulting Land Health Determinations. Table 4 shows BLM's assessment of the relationship between soil indicators and causal factors observed in the North Delta landscape unit. Identification of the factors contributing to soil health is most helpful when it can be pinpointed on the ground, and tied to a specific issue or concern with a soil indicator. Table 5 shows the lowest available estimate of acreages affected by each causal factor, although we must recognize that many of the causes have direct impacts or footprints that are much smaller than the acreages shown. In this table factors are reported only where they were observed at substantial levels in the field within areas not meeting Standard 1 or meeting Standard 1 with problems, where issues and concerns were also observed that can be directly affected by those causal factors.

Table 4. This table shows which causal factors (land uses or natural phenomena) that were observed in the North Delta Landscape Unit are thought to directly impact the soil health indicators as shown with an X.

Causal Factor	Soil Health Indicators						
	Runoff drainages	Pedestals	Plant spacing	Bare soil	Litter	Cryptogams	Basal cover
Drought			X	X			X
Erosion from uplands	X	X					
Livestock grazing- current*		X	X	X	X	X	X
Livestock grazing- historic*	X	X	X	X	X	X	X
Noxious/invasive weeds	X		X	X	X	X	X
OHV use	X	X		X		X	X
Pinyon-juniper invasion	X	X	X	X	X		X
Rec impacts (non-OHV)	X						X
Reservoir/Stock Pond				X		X	X
Rights of Way (not roads)	X			X		X	X
Roads (BLM)	X	X		X		X	X
Roads (Rights of Way)	X	X		X		X	X
Seral Stage Issues					X		
Contour furrows (1960s)			X			X	

*Historic grazing is considered to be pre-FLPMA (Federal Land Policy and Management Act of 1976) and current grazing is defined as post-FLPMA)

Additional impacts to soil health are caused by individual developments, which are generally not detected by the land health monitoring studies. Table 6 shows the numbers or miles of the different types of developments currently documented on BLM which are in the North Delta Landscape unit, and which are often tied to soil indicator impacts .

Table 5. Acreages not meeting or meeting Standard 1 with problems, where land uses or natural phenomena are contributing to issues and concerns with soil health indicators. % calculated from within category.

Causal Factor	Areas where causal factor is contributing to issues and concerns with soil health indicators			
	Meeting Standard 1 with problems		Not meeting Standard 1	
	acres	%	acres	%
Drought	12,825	55	0	0
Erosion from uplands	381	2	0	0
Livestock grazing- current	8,195	35	3,039	77
Livestock grazing- historic	17,834	77	3,039	77
Noxious/invasive weeds	15,192	66	3,039	77
OHV use	9,639	42	0	0
Contour furrows from 1960s	4,786	21	0	0
Pinyon-juniper invasion	381	2	0	0
Reservoir/stock pond	4,786	21	0	0
Rights of Way (not roads)	14,423	62	0	0
Roads (BLM)	14,423	62	0	0
Roads (Rights of Way)	14,423	62	0	0
Seral Stage Issues (exotic plants prevent seral transition)	5,553	24	3,039	77

Table 6. List of developments in areas not meeting or meeting Standard 1 with problems which are potentially contributing to issues and concerns with soil health indicators.

Development Types	Number or length	Water Erosion ¹	Wind Erosion ²	Ground-cover ³
Gas Pipeline ROW (Transco Pipeline)	4.5 miles	X		X
Gas Well/Gas Pad	13 pads/16 well records	X		X
OHV Staging Area	3 user created	X	X	X
Road ROW	18.2 miles county road and State Highway ROWs	X		
Stock trail	0.3 miles	X		

¹ Includes runoff drainages, pedestals, plant spacing, bare soil. ² Includes pedestals, plant spacing, bare soil. ³ Includes litter, bare soil, cryptogam, and basal cover.

Discussion: Drought, current and historic livestock grazing, noxious/invasive weeds, and various roads and Rights of Way were leading factors behind soil health problems in the North Delta landscape unit. Since the year 2000, the UFO has experienced periods of intense and impacting drought. In Delta County, the National Drought Mitigation Center characterized conditions from abnormally dry to exceptional drought conditions 58% of the last 14 years. This is a little over 8 years out of the last 14. And of the 8 years, approximately 111 weeks (a little over 2 years) were characterized as extreme or exceptional drought conditions. The combination of drought and livestock grazing contribute to bare soil and the destruction of biological soil crusts that stabilize the soil. This leaves the soil susceptible to wind and water erosion. There were 10,787 acres with the unit with high levels of bare soil.

STANDARD 2 RIPARIAN: CAUSAL FACTORS

Definition: Causal factors are those uses or natural phenomena which were observed at moderate or higher levels on streams with riparian health problems. Development analysis identifies possible links between developments and riparian health.

Causal Factors

In addition to the limitations imposed by the semiarid climate, a variety of factors influence riparian areas and the resulting Land Health Determinations. Table 7 shows BLM's assessment of possible direct impacts between riparian indicators and causal factors observed in the North Delta landscape unit. Identification of the factors contributing to riparian health is most helpful when it can be pinpointed on the ground, and tied to a specific issue or concern with a riparian indicator. Table 8 shows mileages affected by each causal factor, where factors are reported only when they were observed at substantial levels in the field within areas not meeting Standard 2 or meeting with problems, where riparian indicator issues and concerns were also observed that can be directly affected by those causal factors.

Table 7. This table shows which causal factors (land uses or natural phenomena) that were observed in the North Delta Landscape Unit are thought to directly impact the riparian health indicators as shown with an X.

Causal Factor	Riparian Health Indicators with Issues or Concerns								
	Channel Sinu-osity; Width, Depth	Flood-plain flooding	Rip. width	Water sedi-ment balance	Veg Cover on banks	Rip. plant vigor	Veg diver-sity	Soil mois-ture	Channel stability
Augmented flow	X	X	X	X	X	X		X	X
Channelization	X	X	X		X	X		X	X
Drought					X	X		X	
Flow regulation from dams	X	X	X	X			X	X	X
Intermittent flow			X		X	X	X	X	
Current Livestock Grazing	X		X	X	X	X	X		X
Nearby agricultural or residential use (weed source)						X	X		
Recreation Impacts (not roads)					X	X			X
Road Crossings				X	X				X
Water diversions		X	X	X	X	X		X	
Wildlife use					X	X			

Additional impacts to riparian areas are caused by individual developments, which are generally not detected by the land health monitoring studies. Table 9 shows the numbers or miles of the different types of developments currently documented on BLM which are in the North Delta Landscape unit, and which are often tied to riparian indicator impacts .

Table 8. Mileages not meeting or meeting Standard 2 with problems, where land uses or natural phenomena are contributing to issues and concerns with riparian health indicators. % calculated from within category.

Causal Factor	Areas where each causal factor is contributing to issues and concerns with riparian health indicators			
	Meeting Standard 2 with problems		Not meeting Standard 2	
	miles	%	miles	%
Augmented flow	2.8	20	1.9	13
Channelization	1.3	9	0	0
Flow regulation from dams	2.8	20	0	0
Intermittent flow	1.3	9	0	0
Current Livestock grazing	0	0	1.9	13
Nearby agricultural or residential use (weed source)	0	0	1.9	13
Water diversions	0	0	1.9	13

Table 9. List of developments in areas not meeting or meeting Standard 2 with problems which are potentially contributing to issues and concerns with riparian health indicators.

Development Types	Number or length	Stream hydrology ¹	Riparian vegetation ²	Channel erosion ³
Road ROW	0.7 miles along Oak Creek	X		X

¹ Includes sinuosity and width:depth, flooding, riparian width, water and sediment. ² Includes veg cover on banks, riparian plant vigor, veg diversity, and soil moisture. ³ Includes water and sediment, and channel stability.

Discussion:

Augmentation of streamflows appears to be the greatest factor influencing degraded riparian systems in the North Delta unit. Many of the headwaters in the unit have been modified long ago to transfer water from one drainage into another through a system of reservoirs and lateral canals up on the National Forest. The augmented stream channels are then used for conveyance of irrigation water through BLM to private agricultural lands on the eastern side of the unit, resulting in the drying of some channels and greatly increased flows in other channels. Upstream dams are an important part of this conveyance system, and help to regulate the flow in these streams. Associated activities such as channelization, water diversion, and resulting intermittent flow are also damaging to the riparian indicators that were identified as having issues and concerns in the Determinations section. Livestock grazing and weeds from neighboring agricultural lands are separate factors that are also causing degradation to the riparian indicators of concern along Oak Creek.

Very few developments are located along degraded riparian systems in the North Delta unit, with road ROWs the only developments occurring near to degraded streams and considered likely to affect streams based on development surveys in other LHA units. While the county road ROW along Oak Creek was not specifically evaluated for impacts to the creek, the ROW is likely affecting stream hydrology and channel erosion there.

STANDARD 3 NATIVE COMMUNITIES: CAUSAL FACTORS

Definition: Causal factors are those uses or natural phenomena which were observed at moderate or higher levels on lands with health problems. Development analysis identifies possible links between developments and native plant and animal community health.

Causal Factors

A variety of factors influence natural communities and Land Health Determinations in addition to the limitations from the semiarid climate. Table 10 shows BLM's assessment of the relationship between plant and animal indicators and causal factors observed in the North Delta landscape unit. Identification of the factors contributing to plant and animal community health concerns is most helpful when it can be pinpointed on the ground, and tied to a specific issue or concern with an indicator. Table 11 shows the lowest available estimate of acreages affected by each causal factor, although we must recognize that many of the causes have direct impacts or footprints that are much smaller than the acreages shown. In this table factors are reported only where they were observed at substantial levels in the field within areas not meeting Standard 3 or meeting Standard 3 with problems, where issues and concerns were also observed that can be directly affected by those causal factors.

Table 10. This table shows which causal factors (land uses or natural phenomena) that were observed in the North Delta Landscape Unit are thought to directly impact the native community indicators as shown with an X.

Causal Factor	Native Plant and Animal Community Health Indicators								
	exotic plants	cool season grass cover	forb cover	native plant diversity	warm season grass cover	shrub vigor	shrub hedging	shrub cover	noxious weeds
Contour furrows	X								X
Drought		X	X		X	X		X	
Dumping	X								X
Deposition	X								X
Fire	X	X	X	X	X			X	X
Fire Suppression		X			X	X		X	
Livestock grazing	X	X	X	X	X	X	X	X	X
Historic livestock grazing	X	X	X	X	X			X	X
Nearby agricultural land	X								X
Noxious/invasive weeds	X	X	X	X	X			X	X
OHV use	X	X	X	X	X	X		X	X
Pinyon-juniper invasion		X	X	X	X	X		X	
Rec impacts (non-OHV)	X								X
Stock ponds, gully plugs	X								X
Rights of Way (not roads)	X	X	X	X	X			X	X
Roads (BLM)	X	X	X	X	X			X	X
Road Rights of Way	X	X	X	X	X			X	X
Seral Stage		X	X	X	X	X		X	
Wildlife use	X	X	X	X		X	X	X	X
Wildlife use (historic)	X					X	X	X	X

Table 11. Acreages not meeting or meeting Standard 3 with problems, where land uses or natural phenomena are contributing to issues and concerns with native plant and animal community health indicators. % calculated from within category

Causal Factor	Areas where causal factor is contributing to issues and concerns with native plant and animal community health indicators			
	Meeting Standard 3 with problems		Not meeting Standard 3	
	acres	%	acres	%
Drought	30,987	83	9,353	70
Dumping	3,199	9	0	0
Erosion from uplands	18,638	50	0	0
Fire	7,044	19	0	0
Fire Suppression	1,430	4	0	0
Livestock grazing- current	12,189	33	12,392	93
Livestock grazing- historic	29,204	78	12,392	93
Nearby agricultural land	2,747	7	994	7
Noxious/invasive weeds	25,132	67	12,392	93
OHV use	16,418	44	2,806	21
Contour furrows from 1960s	11,900	32	4,786	36
Rec impacts (non-OHV)	9,639	26	2,806	21
Reservoir	2,261	6	4,786	36
Rights of Way (not roads)	10,568	28	5,780	43
Roads (BLM)	10,568	28	7,592	57
Roads (Rights of Way)	9,639	26	5,780	43
Seral Stage Issues	929	2	11,397	86
Wildlife use (current)	7,525	20	1,761	13
Wildlife use (historic)	929	2	8,359	63

Additional impacts to native plant and animal community health are caused by individual developments, which are generally not detected by the land health monitoring studies. Table 12 shows the numbers or miles of different types of developments on BLM which are in the North Delta Landscape unit, and which often impact plant and animal indicators.

Discussion

A wide array of factors are contributing to poor native plant and animal community conditions in the North Delta unit. These factors can be divided into three categories to simplify interpretation: factors with little impact across the unit, factors with a moderate scope of impact, and factors which have widespread presence across the poor condition areas. This last group includes drought, seral stage, historic and current livestock grazing management, and noxious and invasive weeds. Although BLM has little control over some factors like drought or past acts like historic grazing or the construction of contour furrows, BLM has the ability to control current livestock management and weeds. In addition, some of these factors interact so that control of one may influence the impacts of another, as with livestock grazing and drought, or weeds and a site being locked up in an early seral stage. The factors with a moder-

ate level of presence in this unit include OHV use, historic contour furrows, Rights of Way (ROWs) and BLM roads and routes. These also interact with other factors, for example, livestock grazing along the Transco gas pipeline ROW has reduced revegetation success along the ROW in places.

Table 12. List of developments in areas not meeting or meeting Standard 3 with problems which are potentially contributing to issues and concerns with native plant and animal community health indicators.

Development Types	Number or length	Native Vegetation ¹	Weeds ²	Wildlife	Connectivity
BLM Routes	236 miles		X		
Corral	2		X		
Ditch ROW	3 miles	X	X		
Fence*	7.5 miles			X	X
Grazing Exclosure	3		X	X	X
Gas Pipeline ROW	7.6 miles		X		
Gas Well Pad	25 pads, 27 wells	X	X	X	
OHV Staging Area	3	X	X	X	X
Powerline ROW*	46.8 miles			X	
Road ROW	36.8 miles		X		
Stock pond/reservoir	7		X		
stock trail	10.3 miles		X		
Telephone/Fiber Optic ROW	4.2 miles		X		
Water Pipeline	0.8 miles		X		

¹Includes low cool season grass cover, low forb cover, low warm season grass cover, low shrub cover. ²Includes exotic plants, noxious weeds.

*Affects wildlife movement, so total documented length reported in entire LHA unit.

The decline of the pronghorn herd is likely due to impacts from disease and habitat problems associated with weeds, low levels of native cool season grasses, perennial forbs and shrubs, and a lack of water. Water developments which were created and maintained for livestock have recently not been maintained, primarily due to livestock grazing occurring in winter and spring months when alternative water sources are available. In addition, many water developments were washed out in flash floods in the summer of 2013. The pronghorn likely utilized these developments, so that now during the hottest and driest summer months, the only water sources available are a few ephemeral streams, and reservoirs that are not well distributed, a recently installed guzzler, and the Gunnison River which lies at the bottom of a canyon across the 4-lane highway 50.

Although individual developments were not systematically evaluated in the North Delta Unit, casual observation and impacts from developments evaluated in other units suggest several are contributing to Standard 3 concerns, especially at the site level and most commonly relating to weeds. A few of the developments are also degrading the native vegetation in these areas. For example, several ROW access roads have developed multiple parallel routes which are destroying native vegetation. Additionally some developments cause fragmentation of the native plant and animal habitat through restricting animal movement, by removal of vegetation or serving as vectors for weed spread. BLM routes are the most extensive type of development, with the majority of the 236 miles made up of undesignated motorized single-track routes in the North Delta OHV area.

STANDARD 4 SPECIAL STATUS SPECIES: CAUSAL FACTORS

Definition: Causal factors are those uses or natural phenomena which were observed at moderate or higher levels on lands with special status species (SSS) problems. Development analysis identifies possible links between developments and special status species health.

Causal Factors

In addition to the challenging semiarid climate, a variety of factors influence special status species (primarily Colorado hookless cactus) in the North Delta unit and the resulting Land Health Determinations. Table 13 shows BLM's assessment of the relationship between Special Status Species (SSS) indicators and causal factors observed in the North Delta landscape unit. Identification of the factors contributing to SSS health concerns is most helpful when it can be pinpointed on the ground, and tied to a specific issue or concern with an indicator. Table 14 shows the lowest available estimate of acreages affected by each causal factor, although we must recognize that many of the causes have direct impacts or footprints that are much smaller than the acreages shown. In this table factors are reported only where they were observed at substantial levels in the field within areas not meeting Standard 4 or meeting Standard 4 with problems, where issues and concerns were also observed that can be directly affected by those causal factors.

Table 13. This table shows which causal factors (land uses or natural phenomena) that were observed in the North Delta Landscape Unit are thought to directly impact the SSS indicators as shown with an X.

Causal Factor	Special Status Species and Habitat Health Indicators								
	exotic plants	cool season grass cover	forb cover	native plant diversity	warm season grass cover	shrub vigor	shrub hedging	shrub cover	noxious weeds
Contour furrows	X								X
Drought	X	X				X		X	X
Livestock grazing	X	X		X		X	X	X	X
Historic livestock grazing	X	X		X		X	X	X	X
Noxious/invasive weeds	X	X		X		X		X	X
OHV use	X								X
Stock ponds, gully plugs	X								X
Rights of Way (not roads)	X	X		X				X	X
Roads (BLM)	X								X
Road Rights of Way	X	X		X	X			X	X
Wildlife use						X			
Wildlife use (historic)						X			

Additional impacts to Special Status Species and habitat are caused by individual developments, which are generally not detected by the land health monitoring studies. Table 15 shows the numbers or miles of different types of developments on BLM which are in the North Delta Landscape unit, and which often impact SSS indicators.

Discussion Issues that contribute to areas not meeting or meeting with problems for Standard 3 can have impacts to SSS species habitat and contribute to Standard 4 ratings. Within the North Delta unit, drought was a causal factor in 47% of areas meeting with problems and 14% not meeting for Standard 4 and it was a causal factor in 83% of areas meeting with problems and 70% not meeting for Standard 3.

Table 14. Acreages not meeting or meeting Standard 4 with problems, where land uses or natural phenomena are contributing to issues and concerns with native plant and animal community health indicators.

Causal Factor	Areas where causal factor is contributing to issues and concerns with native plant and animal community health indicators			
	Meeting Standard 4 with problems		Not meeting Standard 4	
	acres	%	acres	%
Contour furrows	11,900	19	4,786	8
Drought	28,977	47	8,359	14
Current livestock grazing	11,228	18	11,397	19
Historic livestock grazing	26,813	44	11,397	19
Noxious/invasive weeds	24,552	40	11,397	19
OHV use	12,838	21	2,806	5
Stock ponds, gully plugs	2,261	4	4,786	8
Rights of Way (not roads)	11,562	19	4,786	8
Roads (BLM)	10,568	17	7,592	12
Road Rights of Way	17,677	29	4,786	8
Wildlife use	2,419	4	767	1
Wildlife use (historic)	2,419	4	767	1

Table 15. List of developments in areas not meeting or meeting Standard 4 with problems which are potentially contributing to issues and concerns with native plant and animal community health indicators (primarily Colorado hookless cactus.)

Development Types	Length in miles	Special Status Species ¹	Special Status Species Habitat ²
BLM Routes motorized singletrack	158	X	X

¹Mainly impacted by removal, crushing or damage or exposure of the root system. ² Includes low cool season grass cover, low forb cover, low shrub cover, exotic plants, and noxious weeds.

Additionally, historic livestock grazing was a causal factor in 44% of areas meeting with problems and 19% not meeting for Standard 4, and it was a factor in 78% of areas meeting with problems and 93% not meeting for Standard 3 (Table 11). Heavy historic grazing use around the Delta area has had long lasting impacts to the soils and vegetation, particularly in the drier sites. These vegetation changes can degrade TES habitat. Noxious/invasive weeds were a causal factor in 40% of areas meeting with problems and 19% not meeting for Standard 4, while they were a causal factor in 67% of areas meeting with problems and 93% not meeting for Standard 3 (Table 11). These weeds degrade habitat value for TES species. Livestock grazing was a causal factor in 18% of areas meeting with problems and 19% not meeting for Standard 4, while it was a causal factor in 33% of areas meeting with problems and 93% not meeting for Standard 3 (Table 11). Current livestock management appears to be an important factor in areas not meeting for Standard 3 and may be contributing to problems for Standard 4.

STANDARD 5 WATER QUALITY: CAUSAL FACTORS

Definition: Causal factors are those uses or natural phenomena which were observed at moderate or higher levels on lands with health problems. Development analysis identifies possible links between developments and water quality.

Causal Factors

A variety of factors influence water quality and the resulting Land Health Determinations. Table 16 shows BLM's assessment of possible direct impacts between water quality indicators and causal factors observed in the North Delta landscape unit. Identification of the factors contributing to water quality is most helpful when it can be pinpointed on the ground, and tied to a specific issue or concern with a water quality indicator. Table 17 shows mileages affected by each causal factor, where factors are reported only where they were observed at substantial levels in the field within areas meeting Standard 5 with problems, where water quality indicator issues and concerns were also observed that can be directly affected by those causal factors.

Table 16. This table shows which causal factors (land uses or natural phenomena) that were observed in the North Delta Landscape Unit are thought to directly impact the water quality indicators as shown with an X.

Causal Factor	Water Quality Indicators with Issues or Concerns							
	E. coli	Fecal coliform	Sediment	Water sediment balance	Macros EPT	Macros HBI	Veg cover on banks	Channel stability
Augmented flow			X	X	X	X	X	X
Channelization			X	X	X	X	X	X
Drought				X	X	X	X	
Flow regulation from dams			X	X	X	X	X	X
Intermittent flow					X	X	X	
Irrigation tailwater	X	X	X	X	X	X	X	X
Current livestock grazing	X	X	X	X	X	X	X	X
Recreation Impacts (not OHV)			X	X	X	X		X
Road Crossings			X	X			X	X
Upstream water quality	X	X	X	X	X	X		
Water diversions			X	X	X	X	X	X
Wildlife use	X	X	X				X	X

Additional impacts to water quality are caused by individual developments, which are generally not detected by the land health monitoring studies. Table 18 shows the numbers or miles of the different types of developments on BLM which are in the North Delta Landscape unit, and which are often tied to soil indicator impacts .

Table 17. Mileages meeting Standard 5 with problems, where land uses or natural phenomena are contributing to issues and concerns with riparian health indicators.

Causal Factor	Areas where causal factor is contributing to issues and concerns with water quality health indicators	
	Meeting Standard 2 with problems	
	miles	%
Augmented flow	1.9	13
Irrigation tailwater	1.9	13
Livestock grazing	1.9	13
Upstream water quality	1.9	13
Water diversions	1.9	13

Table 18. List of developments in areas meeting Standard 5 with problems which are potentially contributing to issues and concerns with water quality.

Development Types	Number or length	Pollutants ¹	Sediment ²	Algae ³
BLM roads	1.7 miles		X	

¹ Includes macros HBI and EPT, and developments which introduce polluting substances into surface water such as E. coli, oil or mine tailings.

² Includes developments which impact water/sediment balance, veg cover on banks, channel stability, ³Includes developments which add nutrients to surface waters

Discussion:

Water is plentiful on top of Grand Mesa where winter storms drop a significant amount of snow. Water is stored in numerous lakes across the top of the mesa and is distributed out through a network of irrigation ditches and natural drainages to private property on the flanks and toe of the mesa. Several ephemeral channels that might naturally only see flows several times a year are used for transmitting irrigation water as long as the stored water lasts into the summer. This augmented flow can make an otherwise dry channel flow for 4-5 months during the irrigation season. These flows resemble a natural stream channel by forming increased riparian vegetation as well as a macroinvertebrate community. However, when irrigation flows run out, the stream slowly dries out as the water that was stored in the floodplain and banks is wrung out like a sponge. Once these flows are gone the stream channel reverts back to an ephemeral channel and the macroinvertebrate community is largely killed off as well as some of the riparian community.

Oak Creek is not meeting standard 2 on 1.9 miles of BLM. The channel is augmented with flows in a channel that would naturally be ephemeral. The poor macroinvertebrate community is largely due to the location of an irrigation diversion above the BLM. The diversion takes water from the channel and leaves the stream with very little flow to support a macroinvertebrate community.

STANDARD 1 SOILS: REMEDIES

Definition: Land Health Remedies are corrective actions which specifically address those Standard 1 soil indicators which showed problems (see Determinations Standard 1 section). The remedies take into account the causal factors. Only the top priority remedies are listed.

Land Health Remedies

- 1) Livestock management during drought (Planned.) Years of prolonged drought across the western U.S triggered national directives within the BLM to create response mechanisms for livestock management during drought. As livestock permits are renewed, a series of drought severity triggers will be used to maintain vegetation cover and litter to protect soils during drought. Field monitoring of drought conditions using climate, soil moisture and vegetation conditions will guide the severity triggers. With these measures in place, the impacts during drought can be reduced and help move soils not meeting and meeting with problems towards improved conditions.
- 2) Increased invasive weed treatments to promote native plant growth. (Needed). There were 15,192 acres where invasive species were one of the causal factors contributing to high levels of bare soil and low levels of cryptogam cover. Invasive species are short lived and can be densely spaced during their growth cycle. This density tends to break up biological soil crusts that typically flourish in the more widely spaced native species. This reduces protective cover for the soil leaving soils susceptible to wind and water erosion. The short duration of their existence also contributes to a lack of cover as well as the lack of woody material, leaving little residual litter material for protection. A more intensive weed treatment program using biological and chemical treatments would help reduce invasive plant production.
- 3) Improved livestock management. (Needed). Rest rotations and pasture management can be used to reduce the hoof impacts to biological soil crust. In the North Delta area where average precipitation hovers around 8", biological soil crust is the most important agent in stabilizing soils. There were 8,973 acres where low levels of cryptogams were present. Smaller pastures should be implemented to promote rest for problem areas.

STANDARD 2 RIPARIAN: REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 2 riparian indicators which showed problems (see Determinations Standard 2 section). The remedies take into account the causal factors. Only the top priority remedies are listed.*

Land Health Remedies

- 1) UFO riparian and realty staff should review irrigation water conveyance systems on BLM lands in the North Delta unit for compliance with right-of-way regulations. FLPMA ROWs and pre-FLPMA ROWs should be managed to allow water conveyance functions to continue while simultaneously preventing undue degradation to public land resources. When FLPMA ROWs are authorized or re-authorized, they should include terms and conditions that limit large and irregular flow fluctuations that can cause erosion, downcutting, and destabilization of channels. The management goal for all ROWs should be to support riparian communities that maintain stable stream channels. Weed control should also be required on all ROWs to prevent undue degradation of public lands. The BLM's preferred approach is to address undue degradation through voluntary and cooperative measures on the part of water users. Oak Creek is the highest priority stream for addressing undue degradation. A more complete evaluation of the diversion records, flow duration, and channel condition will be needed in order to determine how to proceed with Oak Creek.
- 2) UFO should coordinate with the US Fish and Wildlife Service (USFWS) on monitoring the effects of new river flow management practices along the short reach of the Lower Gunnison River in the North Delta unit. Recent plans by the USFWS and the Black Canyon National Park have increased spring peak flows to better simulate the natural hydrograph. Within the Park, these flows are expected to move the riparian area and river channel toward pre-dam conditions, while downstream, the flows are planned to improve habitat conditions for the endangered razorback sucker and Colorado pike minnow along the Gunnison River. Monitoring on BLM should target changes to the riparian vegetation and extent of wetland/flooded habitat, including presence of obligate wetland species, width of the riparian area, and the amount of floodplain that receives flooding, and changes in levels of weeds. The USFWS may have additional factors that BLM should include.
- 3) UFO range and riparian staff should ensure that livestock use of Ward Creek/Doughspoon allotment follows Best Management Practices for riparian areas. Actions should include a review of the grazing and trailing practices in the allotment, particularly along Oak, Doughspoon and Dirty George Creeks. Existing fences should be mapped, surveyed for condition, and repaired where need be to control trespass and trailing, and achieve appropriate distribution. Where existing fencing is not adequate, additional fences and potentially waters and constructed livestock trails should be identified and planned for.

STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES: REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 3 native plant and animal community indicators which showed problems (see Determinations Standard 3 section). The remedies take into account the causal factors. Only the top priority remedies are listed.*

Land Health Remedies

- 1) BLM biological staff should improve livestock grazing management in salt desert shrub vegetation. Changes should address levels of forage use, timing of use, providing for sufficient rest, and ways to be compatible with restoration efforts. Range condition objectives should be established which call for levels of palatable shrubs, perennial cool season grasses and perennial forbs to be within 75% of ecological site potential, as an example. Levels of forage use should be within recommended guidelines found in the scientific literature for the forage species and shrubs, forbs or grasses that BLM is trying to promote. Sheep bedding should only take place in designated, preferably contained areas that minimize damage to the surrounding plant community. These changes must be made in such a way that they can be enforced. Past changes to grazing permit terms have not been fully monitored or enforced, with recurring overuse of key forage species.
- 2) UFO vegetation and soils staff should work with other BLM offices and agencies such as the Agricultural Research Service which manage salt desert vegetation to develop successful salt desert restoration practices. Much of this work should be based on a systematic review of past rehab and revegetation efforts. Factors that should be addressed include: effective ways to manage annual invasive weeds, the interaction of soils and biological soil crust with successful revegetation, and effective restoration species across the different plant functional groups.
- 3) Road ROWs and BLM road and route management are contributing to some of the issues and concerns with Standard 3 indicators. Off route driving and ad hoc movement of ROW access routes is occurring in places throughout the unit. UFO Rights of Way staff should work with Biological and Recreation staff to detect, evaluate and address these problems strategically. Known problems include access routes to the western-most communication site, the route that leads to the catchment, and OHV incursions into the Adobe Badlands WSA.
- 4) Work with CPW and permittees to develop more sustainable water sources for pronghorn and other wildlife species during the spring and summer periods. This may include repair and/or modification of existing water developments.

STANDARD 4 SPECIAL STATUS SPECIES (TES): REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 4 Special Status Species indicators which showed problems (see Determinations Standard 4 section). The remedies take into account the causal factors. Only the top priority remedies are listed.*

Land Health Remedies

- 1) Grazing management. Range, wildlife and vegetation staff work to make changes to grazing management to increase native and decrease exotic vegetation cover to improve habitat conditions for Colorado hookless cactus and other species. Focus on areas “meeting with problems” where there should be a better chance of success in the short term.
- 2) Native Vegetation Restoration. Cooperate with CPW and others to conduct experimental treatments of exotic weed infestations (halogeton) and restoration of native vegetation.
- 3) Protection of Adobe Badlands ONA/ACEC. Recreation staff work to reduce impacts to ONA/ACEC from vehicle incursion. Range, wildlife and vegetation staff develop changes to domestic sheep management to decrease impacts from dispersed sheep bedding and trailing within the ACEC. Actions should include designation of trailing routes and sheep bedding areas.

STANDARD 5 WATER QUALITY: REMEDIES

Definition: Land Health Remedies are corrective actions which specifically address those Standard 5 water quality indicators which showed problems (see Determinations Standard 5 section). The remedies take into account the causal factors. Only the top priority remedies are listed.

Land Health Remedies

- 1) Instream Flows. BLM has a robust instream flow program to establish water rights for aquatic and riparian habitat. While the water rights are junior to most other water rights on the stream segments the water right is a place holder for the future when the water right may have more senior priority. In streams that have a natural flow component, a portion of that water should be filed on for instream flows and held by the Colorado Water Conservation Board (CWCB). The BLM has filed for an instream flow water right on Alkali Creek and is waiting for a decision by the CWCB.
- 2) Bacterial Levels - Fencing. Several streams measured had elevated levels of bacteria. This is likely due to livestock grazing in the stream channel and riparian area. Installing riparian exclosures and drift fences would limit the amount of stream channel available to livestock grazing and trailing. Reduced activity in the riparian area would reduce the amount of bacteria being deposited where runoff can mobilize it.
- 3) Sediment Mitigation. In the 1960's thousands of check dams were built in small drainages to stop the rapid erosion of the Mancos shale. Some of the dams are filled with sediment and are still functional while others have breached and spill sediment with each runoff event. A specific mitigation plan for each structure needs to be developed, and each year some number of the structures should be rehabbed.

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